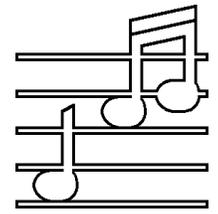


AUDIO BASICS



The Complete 1987 Back Issue Set.

VOLUME SIX NUMBER ONE JANUARY, 1987

Obviously we got enough renewals from all you nice people to make it worthwhile doing this again for another year. **Thank you very much for your kind support.** We got far more letters suggesting subjects, changes, or improvements for *Audio Basics* than I can possibly answer one by one. Look for answers to your questions in future issues of *Audio Basics* as they are applicable to the general interest of our readers.

I did get two letters of special concern to me. The first was from a reader in Yugoslavia who is disappointed that I have not recently related more "tips" on really easy things you can do free to your audio system to make it better, no matter what the system is, such as the "Long-horn" stabilizer bar for phono cartridges, or Plast-i-clay damping for loudspeaker frameworks. The reason I have not given out too many general purpose "make your system work a lot better for free" tips recently is that it isn't easy to make suggestions that are universal to all audio systems. I can better serve most of you with slightly more specialized useful advice such as the following.

Here is a nice improvement that is **possible for you to do yourself** to nearly all Audio by Van Alstine power amplifiers assuming that you understand the following "rules":

You certainly can damage or destroy your power amp trying to do this if you don't do it right. What you do is **your responsibility!** Don't start if you are not accomplished at electrical assembly and don't clearly understand what you are doing.

We can do it for you. We will charge \$100 for smaller amplifiers or \$150 for larger amplifiers. We, of course, will go a bit further than this article with some running production changes that have occurred over the past 60 days, but that cannot be retrofitted in the field because of the difficulty involved. **Call us before shipping** to confirm that your amp can be retrofitted and at what price, and to insure that it has not already been done.

You must start with an amplifier that has been off and unplugged for a day so that the internal power supply capacitors have discharged.

People buying our power amplifiers for the past several months have noticed a nice (unadvertised) improvement – they are getting **quieter, smoother, and clearer than ever.** Essentially, we are making a better trade off in the **allocation of power supply resources.** The main power supply feeds both the output mos-fets and the audio circuit cards. When the output mos-fets draw lots of energy to drive your loudspeakers, they impress a copy of the audio signal on the power supply. This "ghost" of a signal then appears on the power supply feeds to the front end circuits, and can cause lots of distortion by injecting the audio signal into the circuit in the wrong places. **Don't panic!** There are lots of things an audio designer can do (and does) to get rid of this problem.

First of all, the larger the main supply the smaller the problem, because, all other things being equal, making the main power supply capacitor bank larger makes the signal impressed upon it by the output circuits proportionally smaller. There is an obvious cost and size limit to making the main power supply larger, however, and if the supply gets too large, then power switches, diode bridges, and transformers may fail due to the enormous transient charge surges at turn on.

Obviously, having a completely separate power supply for the output circuits and for the small signal circuits would be useful, to the extent that they really are separate, and at what cost, and assuming this approach doesn't cause other problems.

Two separate sets of transformer secondary taps, diode bridges, and supply capacitors do not provide perfect isolation as the output circuit still couples back to the drive circuits through the transformer. The additional isolation provided with the extra parts and space, may, or may not, be worth the money.

If the audio circuit boards are "too isolated" from the output circuits, strange things may start to happen. The two circuits will not turn on or turn off together. If the drive

circuit is turned on and the output circuits are not, then the drive circuit (if it has adequate current drive to always control the output circuit) can, under certain conditions, destroy the output circuit or itself. Essentially, if an audio signal is injected while the small signal circuits are on and the output circuits are off, the small signal circuit will try and make the outputs perform anyway – and may hurt itself or the drive circuits. Obviously, a current limited drive circuit won't be able to get itself or the outputs into trouble, but won't be able to drive the outputs well in any normal use condition either.

Fortunately, most rational drive circuits are, to a great extent, self rejecting of trash – including extraneous audio signal – on their power supply feeds. "Power supply rejection" is a normal engineering specification useful in the evaluation of drive circuit conditions and off the shelf audio devices such as op-amps. Obviously then, designing an audio circuit that much better rejects supply garbage is the same as making a much bigger power supply – it doesn't matter which side of the ratio you work on. Thus, **the amateur cannot judge the merits of a given power supply "size" alone** – he must also know the circuit design the power supply is attached to and its rejection characteristics.

It is like finding out that Joe up north walked half way into his local forest while Jack down south walked 20 miles into his local woods. Obviously, Jack walked a lot further – until you find out that Joe's local forest is 400 miles wide. You better have all the data necessary to make comparisons when you start comparing.

Anyway, it is usually less expensive and more effective (although a more difficult engineering problem) to make the circuit better reject the power supply irregularities than it is to make the power supply better. Obviously, the best of all possible worlds is to do both. Our ideal would be an infinitely stiff power supply with zero noise attached to an audio circuit with perfect rejection.

Obviously then, a power supply with voltage **bouncing all over the place** is not our idea of good design because a lot of this variation will adversely effect the performance of the small signal circuits.

Thus, we have doubts about amplifiers (such as “magnetic cubes”) deliberately designed to have a variable voltage power supply. That is a good way to get lots of test bench power cheap, but not the way we think best for musical performance.

A relatively easy and inexpensive way to “decouple” the power supply for the front end circuits from the output circuits is **with a few resistors and capacitors**. If you use a small value resistor in series with the power supply feeds to the front end circuits (which draw little of the total current demands of the amplifier) you will take a voltage drop across the resistor, and reduce the amplitude of the garbage on the supply feed too. You can then follow this resistor with another power supply capacitor (need not be as big as the raw supply capacitors as it is for the small signal part of the circuits) and much further reduce the extraneous trash on the supply. We have been doing this for years in all our amp circuits to get good power supply decoupling.

However, there is no such thing as a free lunch. A simple R-C decoupling network has its limitations too.

The larger the resistor, the larger the voltage drop to the front end board, and the lower the effective power supply voltage becomes. Because the ultimate output power of the amplifier is proportional to the power supply voltage, making the decoupling R bigger lowers the overall power of the amplifier.

The R-C network does impart a phase shift to power supply of the front end. At some point, dependent upon the values of the R-C network and the design of the drive circuit, this phase shift may become large enough to impart positive feedback to the circuit, which is de-stabilizing. Carried to an extreme, an excessively large R-C network could turn an amplifier into a low frequency oscillator.

Some circuit designs only operate properly over a limited range of supply voltages. Dropping the voltage to the front end can totally screw up the circuit operation. This is one reason many amplifiers have large on or off thumps and turn into high frequency oscillators or sound bad under “brown out” low AC power line conditions. Obviously, a user change to an amplifier with a voltage sensitive drive circuit could make sonic differences even the editors of *Stereo Review* can hear – when the amp changed turns into an oscillator and blows up! Thus, **do not attempt to make changes similar to those described herein on other brands of amplifiers**. Audio by Van Alstine amplifier circuits are

absolutely stable over a wide range of power supply voltages, many other designs are not.

Anyway, it is obvious that “juggling” all the aspects of power supply design to get the best possible performance - price ratio is no easy task, and takes excellent judgement calls based on experience and careful listening – and there is no exact answer that we know of.

Because there are no “absolute sounds,” we from time to time go back and judge ourselves again asking if we really did put together the best possible set of ratios in our power supply designs. Can we do better? A few months ago, we decided that we could do better, and have done better, unadvertised, and at no extra charge. Now we want to tell you too, so you can make the improvements yourself without the expense of a return to us if you desire. Remember too, your amplifier is very good just as it is. These changes don't make your existing amp worse. You do not have to make the changes. If you are satisfied now then why worry?

Essentially, the improvement involves a **favorable trade-off between overall output power and clarity and low noise**. In the second paragraph above, we mentioned that making the decoupling resistor bigger causes a voltage drop that lowers the output power of the amplifier, something we were concerned about because **everybody wants as much power as possible** at a given price. However, another factor is now obvious. If we make the resistor about ten times larger (for example) that cuts down the undesirable power supply trash by a factor of 10, while the voltage drop (depending upon the values of all elements involved) is only 2-4 volts resulting in a very small reduction in power.

From a subjective standpoint, nobody can hear the power loss – its only a fraction of a dB. Everybody can hear the sonic improvements. First of all, output hum is obviously greatly reduced. Second, the clarity and resolution seems to improve that whole factor of ten. Finally, the standard Mos-Fet C circuits more closely approach the level of performance of the Transcendence circuits as they did not have as superior a power supply rejection capability in the first place and really respond favorably to the cleaner supply.

You will need to acquire four 300 ohm 1 watt resistors. We will supply them **free of charge** if you supply us a self-addressed, stamped, **padded** small heavy duty mailing envelope. Figure postage for one ounce more than your envelope alone. Note to Canadian readers, **we cannot use Canadian postage stamps** in mailing from the U.S.A to Canada. Packages originating from the U.S.A. must have U.S. postage. The “free of charge” offer is because

it costs us more in paperwork to fill a little order than the value of the order if we have to go through the whole record keeping mess for the gummit. Thus, obey our rules and get the parts free – otherwise your request will be ignored.

There is no “universal” cure. There are some of our power amplifiers that cannot be upgraded in the field. **Do not attempt the upgrade on the following:**

First generation Transcendence amplifiers with ground plane audio boards. There is too great a risk that you will damage the double-sided PC cards.

Single ended power supply amplifiers – all Mos-Fet 120, Mos-Fet 80, SCA-80, SCA-80Q based units. Although the improvement is very useful (only two resistors required) the change **requires bench realignment**.

All Dyna St-150 chassis amplifiers because it is very difficult to access the necessary parts on the audio board(s) without removing and reinstalling other wiring – a project beyond amateur scope.

All Bipolar rebuild St-400 based amplifiers – the modification is not applicable to the original Dyna audio circuits.

All of our power amplifiers are built with a **decoupling resistor in series with the raw power supply feeds** ahead of any audio board circuit parts. There are **two resistors per channel**, one for the + supply, one for the - supply for each channel. On single ended amplifiers there is no - supply. All our amplifiers typically have a resistor value of 47 ohms or 100 ohms. **Very recent amplifiers already have 200 or 300 ohm resistor values and should not be touched**. Depending upon the power supply voltage of the amplifier, the resistors can vary in size and appearance. The 47 ohm resistors are either RN60D metal films marked **47R5F** or are larger body RL42 resistors with a **powder blue body and color stripes – yellow, violet, black, red, white**. Where 100 ohm resistors were used, the small RN60D parts are marked **1000F** or where larger RL42 units were used, these **powder blue parts are color striped – brown, black, brown, red, white**.

Essentially, all that is necessary to do is to replace the two 47 ohm or 100 ohm supply decoupling resistors per channel with 300 ohm one watt rated resistors. This will drop the garbage on the audio circuit power supply substantially, without adverse side effects (described earlier herein). The hard part is locating and replacing the resistors without damaging the boards, changing trim-pot adjustments, making solder blobs, bridges, or burns, and making sure you have changed the correct

parts. Essentially, you must trace the power supply wiring from the + and - capacitors to the PC boards, and then through the resistors to the circuits. **Call us for help before unsoldering things** if you are uncertain. Let us know what you think of the improvements.

A few of you have written to complain that I talk too much about our own products. So, I am not now going to tell you that there is a **major improvement in all our Fet op-amp circuits** in production as of January 1, 1987 at no increase in price. I am also not going to tell you that if you had Super Fet Two circuits done in the past quarter (since 10-01-86) that the retrofit to **Fet Three is free of charge!** I don't want to annoy you.

Many of you have probably heard about the new **Hafler XL-280 amplifier** and many have read Hafler's claims in *Audio* this month that "nulling" the audible difference between input and output guarantees vanishingly low distortion of all forms.

Not necessarily true!

Being able to get an excellent "null" between input and output **does not show that all audible distortion is low.**

Not being able to "null" at all **does not guarantee the presence of distortion.**

Hafler has overlooked the fact that an amplifier generating transient distortion modifies its own input signal. The input impedance, which is usually feedback loop dependent, changes as internal stages go into saturation or cutoff. This **loads down, and distorts the input signal.** It certainly is subsequently possible to "null" the predistorted input with the output – which shows nothing except that the **input distortion looks like the output distortion.** The distortion is still there. You have just used a different set of "blinders" to not look for it.

Obviously, if the amp under the "null" test has any phase shift, it will not null. **Phase shift is not distortion.** It is simply a time delay. The time between when the recording you are listening to was made (probably several years ago) and now could be expressed in degrees of phase shift (many!). Likewise, a broadband "time delay" through an amplifier is not distortion. An inverting phase circuit, for example, has 180° of phase shift, but this characteristic does not necessarily mean any additional distortion at all. Of course, if you are worried about the inverted phase, you can always add another 180° phase shift by reversing + and - connections at your speakers, generate a complete 360° phase shift, be back to non-inverted phase, and still have no additional distortion.

Since it can be shown that at least one condition (phase shift) will not "null" but does not indicate distortion, and since it can be shown that significant distortion (transient and input impedance related) can exist and still "null" then **we cannot see any significant value in the "null" test as it proves nothing.**

Regarding the **Hafler XL-280 itself**, it is essentially an enhanced **DH-220 amplifier.** Some of the enhancements we find useful and some we do not.

The aspects of the XL-280 we find interesting are the **additional power mos-fet output devices.** The XL-280 has six per channel instead of four – which gives it 50% greater current reserves into low impedance loads. **We wish Hafler would have used the "big die" DH-500 type mos-fets** in this application and gained nearly another 50% of reserve current. **We are using the big die mos-fets in our Mos-Fet 280C and T-280 circuits to provide twice the current capacity** of the 220 series for low impedance speaker applications. (Apogee owners, take note).

It does have stiffer and better isolated power supply circuits than the 220 series amplifiers and this is very useful.

It has a "different" front end configuration than previous Hafler amplifiers and uses fet input devices. We are not too sure about this configuration as it loads down our signal generator more significantly than most other "outside" amplifiers do, causing obvious slewing of square waves. (A.V.A. circuits have pure resistive inputs and don't load our generator at all.)

We don't like the idea of a user adjustable circuit peak at all! The XL-280 has a large leading edge "spike" on square waves that can be enlarged or reduced, but not eliminated, by a user accessible capacitive "tweak" control. Hafler claims that adjusting the amplitude of this large, above audio range, high frequency spike is what gives it a better "null" into certain loudspeakers. I am not so sure how certain tweeters and capacitive loads are going to react to an amplifier with a designed-in high frequency spike, especially one that has no decoupling inductor to isolate it from adverse capacitive loads. I wouldn't want to bet on how the amp would behave under strange load conditions either.

Finally, the amp has DC coupled inputs - **a definite "no" in our book** - for it guarantees that the amplifier can accept input signals it cannot linearly amplify – the "envelope" of internal linearity can be exceeded.

Enough of this data, what you really want to know is "how does it sound?" A little bit different. In comparison to other Hafler amplifiers, it is a bit clearer (but brighter) with a bit better bass impact, but a bit "clunkier" too. I guess it reminds me of many Crown amplifiers I have heard in the past. **It is a good amplifier overall, and excellent for driving low impedance loads at a budget price.** but, unlike the Hafler MA-1 mobile amp, it is not a great amplifier. I did not try to "null" it after observing that the "null" control could not give flat frequency response at all. We will tell you more about our circuits for it later, but we can say that the enhanced current capacity is very useful for those that really need it.

For our last subject this month, I would like to give you another look at the **B&W 802F Special** loudspeaker. Readers who have been with us for a long time know that in the past I was not particularly enthused about this B&W model – feeling that the top was a bit bright and the junction between the bottom and the mid-range was a bit compressed and disconnected and that it wasn't as good a value as many other B&W models.

However, this loudspeaker, like the larger 801, is **modular in design**, and thus separate sections can be easily upgraded and retrofitted. And, **B&W has made very useful improvements to the 802** that make me very pleased with current production:

The earliest improvement was the change from a fabricated wood mid-range "head" enclosure to a **concrete** mid-range enclosure, with the useful mid and high frequency adjustments of the more expensive 801. This was the change from the 802 to the 802F model designation, and brought improved clarity and continuity. More recently, the 802 has received the newer polyamide film tweeters, replacing the older polyester weave units. This is the "Special" designation change, and is what I am currently listening to here. The last change has **really put the speaker all together, in dynamics, impact, and in just plain enjoyment.**

The 802F Special handles lots of power, has excellent range extension, absolutely superb imaging and space characteristics, and will go loud easily. It is, properly driven, a much much better loudspeaker than the Matrix 3 or Matrix 2, and easily worth the difference in price. **It probably costs B&W twice as much to fabricate as the Matrix 3,** and I am sure B&W would like to discontinue them in favor of the Matrix 3. However, I sure hope they don't, because at our selling price of \$2100/pair, they are a much better value. I really cannot think of any loudspeaker priced under \$3000/pair that

I would rather own myself. And, the 802F Specials simply do not make the space, position, or esoteric power demands on your room and electronics budget that most other great loudspeakers do. They take up no more floor space than bookshelf units (11.75" wide x 14.5" deep) x 41" high and 70 pounds. With complete electronic protection and really nice real wood finishes, the 802F Special has won my approval.

Frank Van Alstine

VOLUME SIX NUMBER TWO FEBRUARY, 1987

It's the middle of February and we still have not had any snow accumulation or really bitterly cold weather here this winter – the mildest I can ever remember in Minnesota – kind of a Cincinnati winter. I'll take it! It has helped me feel like spending a lot more time out and around when I don't have to fight frostbite or avoid oncoming semis sliding sideways at me. Among the places I have spent more time at is the library, checking out Compact Discs.

Again, I cannot emphasize too much how valuable a source your library can be, even if you don't have a DAT (digital audio tape) player. At the very worst, your library will allow you to "preview" many compact discs before you buy, to help you avoid those that disappoint you. At best, you are going to find lots of real gems at the library, CDs you would have otherwise overlooked. Audition many more brands, performers, and types of music. Widen your horizons at no cost or risk. Then go out and buy the best of the program material and enjoy. Remember, the guy who had the CD checked out before you could not have played it on a toy phonograph and destroyed it or made it damaging to your CD player. Do look at the **bottom side** of library CDs before you play them however, to make sure there is no foreign matter stuck there that could be transferred into your CD player. You may also have a substantial load of fingerprints on library CDs to get rid of.

Van Alstine's free CD cleaner (well – almost free) is a few Q-tips (cotton swabs) and some distilled water. Wet Q-tip end and gently rub back and forth on a radius - center to edge (**never around and around**) and then follow up with a dry Q-tip to remove moisture. Distilled water is available at any drug store. Use only if a CD is fingerprinted or pizza deposited so bad it won't track. Don't clean unless necessary.

One reader complained that my idea of making digital tape copies of CDs from the public library is "theft" and it was not a nice thing for me to do. Nope, it's not theft – I have already paid for those CDs – it's called taxes. I am not

making copies to sell to others, simply for my own use. No damages done to make copies, for your own use, of property you already paid for and own.

I have to laugh at all the major recording companies and equipment manufacturers who are now busy worrying about releasing Digital Audio Tape recorders into the market place, especially ones with digital input ports data compatible with CD players with digital output ports (such as the new generation Philips-Magnavox CD players). Their fears – that **DAT machines will make copies that are too good!**

Finally, I am vindicated! For years and years I have been telling my clients not to bother with an expensive cassette deck because it is a **low fidelity** format that makes copies that are not good enough. Now all the major companies back up what I have been saying (a voice in the wilderness) for years. When they express concern that the DAT is "too good" **what they are really saying is that its O.K. with them for you to have an analog cassette deck because it makes such crappy copies that they don't care – and they are the ones who have been telling you to buy that analog tape recorder! Honest folks, aren't they?** Its O.K. for you to own a bad tape recorder (and they have been busy selling you them) but its not O.K. for you to own a good one. Do you want to think about the logic and ethics of that concept? You tell me who has been telling the truth.

I have spent more time this winter out listening to live music. Last night it was the St. Paul Chamber Orchestra with Pinchas Zukerman conducting a program of Rossini, Haydn, and Vivaldi, and "starring" in a performance of Vivaldi's *The Four Seasons*. Since the performance was at Carleton College's Skinner Memorial Chapel in Northfield, Minnesota, I was able to sit closer in a more intimate environment than usual for a performance of a world class ensemble. I like to shut my eyes at times during a real concert and imagine I am **listening to a hi-fi system** and then critique that hi-fi system and compare it to the best I have at home.

In this case, it was tough to do because Zukerman's violin performance in *The Four Seasons* was so much more powerful and lucid than anything I have on record and CD that thinking past the genius of his playing is difficult. It was a bit easier with the Rossini *Overture to La Cenerentola* because Zukerman did not play, but "just" conducted – a musical experience too.

Anyway, with a seat about 40 feet from the podium, I tried to listen to this performance for a bit as if it was a stereo system. I do this every time I go to a live performance. My first thoughts were that *The Absolute Sound* and

Stereophile shouldn't get so "absolute" about the virtues of the exotic megabuck equipment they seem to love and promote so highly. Sorry folks, \$5000 vacuum tube preamps and \$20,000 Class A boat anchor power amplifiers simply don't come close to "real" and don't deserve the pages of prose they get. My second thought is that you, dear reader, shouldn't spend so much time worrying about the perfection and absolute specificity of "imaging" with your audio system. I hate to tell you this, but even with good seats in a good sounding and compact hall, exact placement of all the musicians simply does not exist – especially in a locatable "front to back" mode. Certainly there is a marvelous sense of "space" in the music and great smoothness, but no "holographic" effects at all!

I really hope you will take every possible opportunity to listen to live concerts as you can. First, because it is usually one of the most rewarding experiences possible, and second, to keep you from demanding non-existent virtues from your audio system. As an equipment designer, my continuing live listening experiences direct me towards doing better what can be done better, without trying to "tweak" the equipment or diddle with phase gain characteristics to give you sonic effects that simply do not exist in the real world at all. Our goal is to reproduce music accurately, not to create the music. The composer, musicians, and conductor did that and our equipment, lacking artificial intelligence, cannot improve upon their efforts.

The most recent issue of *Stereophile* (Vol 10, No. 1) had an evaluation of the **Hafler XL-280** with a couple of curious observations. First of all, they attempted to compare the XL-280 with **another amplifier that they have never heard at all!** That is getting far past my poor power to evaluate. Secondly, they tried to make Hafler's "null tests" on a bunch of other amplifiers and then agonized a lot about the shapes of the "non-null" curves that resulted with the other amplifiers. There seems to be a lack of rational engineering advice on their staff as its quite obvious that the dominant factor in all of their curves was **simply phase shift**, which isn't distortion at all, and, if static, and not dynamic, is not audible at all.

Last month I mentioned that letters from **two readers** were of special concern to me. I discussed the comments of one reader then. I didn't get to the second one, but I shall now. The second reader was **really unhappy that I used the term "romantic" when discussing the sonic quality of our new Mos-Fet 400C amplifier**. He thought I was making a big engineering "cop-out" by designing equipment to appeal and sell because it had some distinct sound of its own. He **read into my comments a lot more than was there!**

No, we certainly are not designing equipment to have some pleasant sound of its own. However, we are not omnipotent! We do not design perfect audio components and we do not know all the reasons that audio components are less than perfect. Thus, every audio component made (by us and by others) does deviate, more or less, from perfection, and does, more or less, have a sound of its own. Fortunately, many of the minor deviations are not serious, and are not unpleasant. Any audio writer, attempting to subjectively describe the "sound" of an audio component, is obviously describing its imperfections, as if the component was perfect, it would have no sound at all and there wouldn't be anything to describe.

My thoughts regarding the big Mos-Fet 400C as compared to the much more expensive Transcendence 400 and 500, was that while it remained very clear and very dynamic, with excellent transient attacks and obvious gobs of force, it did ever so slightly "round off" rough edges and "warm up" cold and sterile performances, and thus, could be called slightly "romantic" in character. Because the effect is very slight, and because I cannot be certain as to whether the effect is good or bad (a lack of internal grain or an internal rounding) and because there is no way to be absolutely sure about the "sound" of the source material, I felt it was fair and reasonably clear to my readers to describe the "sound" of the Mos-Fet 400C in this way. I didn't expect readers to dig so far "between the lines" looking for implications that simply do not exist in my writings.

Sometimes I get frustrated and think I should categorize *Audio Basics* subscribers into three distinct groups based on the phone calls and letters I get. Group One is *Audio Basics* subscribers. Group Two is *Audio Basics* readers (a sub-set of Group One). Three is *Audio Basics* "between the lines" interpreters (a different sub-set). I know there is a great gulf in the written communications between the writer and the reader that needs to be bridged. Namely, from **what the writer thought he said, to what he actually said, to what the reader actually read, to what the reader thought he read.** Make life a bit easier for me and you. Read all of, but only what is there. I did not intend to say any more, or less. I want you all to belong to Group Two, for Group Two to include all of Group One (and vice versa), and for none to belong to Group Three.

Speaking of reading between the lines, my mention of the "large die" power mos-fet devices we are using in the 400C has brought about an onslaught of letters asking if they should not be used in the smaller amplifiers too. The answer is no, the virtues of the large die mos-fet do not improve the performance of the smaller amplifiers. If one already has adequate die area and power and current dissipa-

tion for a given power rating into a given load, then adding die area is completely redundant – and there is no point paying extra for unnecessary and never used capacity – a bigger gas tank does not give you better fuel economy.

The virtues of the "big die" mos-fet is that it is equal to 1.25 of the standard devices, and allows you to have more power and current capability **where you need it** without requiring the physical space (sometimes unavailable) for more devices. It allows us to have safe 200 watt per channel operation in the St-400 chassis without the expensive task of machining the heat sink. It allows the use of the 400C circuits in a Dyna St-410 chassis where it is otherwise impossible to do as there is no room for more devices. It is a waste of money in a St-120 chassis, for example, because four standard devices are more than enough for its power and current ratings.

Some oriental audio companies are making great claims for the virtues of **optical coupling** especially in their CD players.

Optical coupling is a useful technique for dumping digital signals long distances through fiber optics cables. Telephone companies love fiber optics because the cables are much smaller in diameter than conventional metal wires (per unit of information capacity), and thus take up much less space (and allow much greater future capacity) in existing underground conduits. The fiber optics cables are essentially self-insulating, are waterproof, and are immune to picking up noise and stray signals from nearby magnetic and RFI sources. Not a small consideration, plastic fiber optics cables are much less expensive than the equivalent capacity in insulated copper wires.

The signal into the fiber optics cable is light from a LED. At the other end, the signal is "read" by a photocell. **Both LEDs and photocells are very non-linear devices with limited dynamic range capability.** In addition, each type of device needs a drive or decode circuit associated with it to transmit or receive the signals. Optical coupling between an LED and a photocell is useful driving telephone company fiber optic cables mentioned above, and for other engineering applications, such as coupling a signal between two completely isolated chassis such as between sections of mainframe computers. Coupling capacitors and transformer coupling isolate too, but at audio frequencies, not at digital data transmission frequencies. Obviously, the non-linear transfer characteristics of the LED - photocell is no problem for digital data transmission, where all you care is if the devices are turned on or off hard, quickly, without excess overshoot, and you don't care what the wave form looked like in the transition between states. **Now, lets apply this technology to a CD player.**

Do we have separate chassis we need to completely isolate? Nope, seems like all the "works" are inside a single chassis, with a single power cord and power switch. No "absolute" isolation is possible, as whatever trash is there will show up on both sides of the optical coupler through the common grounds or common power supply sections – even if the signal side is isolated. And, of course, trash on one side of the device will "modify" the signal being transmitted, and send itself right along across the bridge with the desired signal.

Do we want to optically couple an analog signal after the digital section? No way! The distortion and compression that would generate would make your CD player sound worse than a kiddy phonograph.

Do we need to send the signal many miles through limited and finite reserve conduit space making huge savings between the cost of fiber optics and copper? You have got to be kidding! We are sending a signal a few inches at most inside a little CD player.

Do we need to couple anything at all? Nope! Also – you tell me why the same folks who tell you that the **only right way is DC coupled all the way** in their amps and preamps, now tell you that the **only right way is lots of coupling stages in their CD player. You tell me why several completely unnecessary optical coupling stages work better, sound better, and are more cost effective than direct coupling the same signal through a bit of wire or circuit foil.**

Do you give up? So do I. In fact, I suspect that all other things being equal, optical coupling will guarantee worse sound and performance from a CD player, because if that was built into the cost, something else important had to be left out. The advertising department strikes again!

Crass commercial announcement! For those of you that just have to have **infra-red remote control built into your CD player, we now have it available.** We can start with the new Magnavox CDB560 (instead of the CDB460) **for \$50.00 extra** with any of our three CD circuit sets, the Fet Three, the Fet Three Plus, or the Transcendence Two.

One of my good readers and critics, C. J. Poulos, an expert audio salesman from New England, wrote recently to tell me that I have neglected writing about another level of **loud-speaker improvements that you can do yourself – namely structural reinforcement of**

the cabinet. He is right, I do know about that, but have dropped the ball and have not specifically told you about it.

Long ago in *Audio Basics*, I told you about the technique of damping the frameworks and panels inside loudspeaker systems with plastic modeling clay (Plast-i-clay or Permoplast — **not Playdough**) to “tame” spurious resonances and “take away” sounds that are not supposed to be there, thus making a substantial improvement to the quality of your audio system. Many of my readers have done this with uniformly great results (only B&W, in their Matrix and 100 series, has ever put my resistive speaker framework damping ideas to work in a production product).

Obviously, while the resistive damping material will “calm down” smaller vibrations, a speaker system with large flexible panels (almost all loudspeakers except very small bookshelf units and those with factory installed internal bracing) needs a bit more drastic treatment — namely structural reinforcement of the insides with user supplied bracing.

This is a “make sawdust” project — for those of you that can hack up a bit of wood without damaging your surroundings or yourself too much. And, of course, it may void your loudspeaker warranty, so proceed only with caution and care.

I cannot give exact directions — there are too many iterations possible with all the brands out there. So, what we can talk about is general guidelines.

In general, the cabinet panels of loudspeaker systems are inadequately rigid and inert. They resonate and radiate much more acoustic output (all wrong) than you would guess — sometimes less than 10 dB down from the direct output of the driven elements! **We don't want our loudspeaker cabinets to sound good — we want them to not sound at all!** You can rap on the sides or back of your loudspeaker cabinet and probably hear a hollow quality to the rap. That is the sound of your cabinet resonating, and it is doing it all the time, producing that same hollow sound, while it is playing.

We mitigate this problem by making the panels much stiffer. We do that by bonding reinforcing braces and struts to the panels on the inside. And, we must do that without damaging the wiring or drivers, without reducing the internal cabinet volume a significant percentage, and without interfering with the acoustic characteristics of the cabinet tuning.

You are going to have to work within the confines of the “woofer hole” so you must first be able to remove the woofer without

damaging it or the cabinet, disconnect the wiring to the woofer keeping track of the polarity of the connections (there is only one right way to re-connect) and get your hands, light, tools, and the bracing materials into the cabinet through that hole. Don't start the project if finishing it will be impossible!

In general **an excellent example of factory installed internal bracing is the B&W DM330.** In this loudspeaker, a “strut” is bonded to the top, sides, and bottom of the cabinet all the way around, and cross-braced from side to side. If you have a helpful B&W dealer (and salesman) in your area, ask him to pull a DM330 woofer and look inside the cabinet. That's exactly what you should be doing to your loudspeakers. Or, if yours are a lost cause, buy the 330s, they are very good values!

Obviously, you will need to remove and re-install the internal insulation material from your loudspeaker cabinet. If the material is fiberglass, we advise the use of rubber gloves and a facemask to prevent irritation, and better yet, replace the fiberglass with a loose Dacron fiber fill. You can buy the Dacron “angel's hair” in bulk at most K-Mart type stores, it is used for toy stuffed animals and pillows.

The panels that need the most “help” are the biggest ones. We advise the use of 1" x 2" boards, cut to fit, and glued edge on from the top to the bottom of the cabinet, and then cross braced internally from one side to the other. The cabinet back will usually need a brace too, and in some cabinets, it is possible to glue a chunk of 2" x 4" material from the inside of the front panel (near the woofer) to the back panel and stiffen that up a bunch too. Sometimes it is possible to build a support and reaction strut directly supporting the woofer magnet.

While you are at it, why don't you provide (assuming your speaker has a flat top) a reaction mass load too — a concrete block or patio slab of appropriate size, wrapped in a Naugahyde cover (to prevent scratches and rattles) placed on top of the speaker. You will be amazed at how 50 pounds of additional reaction mass improves the bass, dynamics, imaging, and impact of your system, and improves it at a low cost! Sorry, you will have to go hunt down and shoot your own Nauga, and I don't know when the season is in your area.

If you own big “planar” loudspeakers, such as Magnapans, Acoustats, or Apogeos, **think about some way to tie them down!** Those big panels are **flapping around as they play!** How about installing a compression brace between the top of the speaker panels and your ceiling — anything to keep that big panel from waving back and forth. Again, you will be amazed to hear the difference when only the

driven elements of your loudspeaker can move, with the cabinet panels and the cabinet itself “nailed down” so it cannot move at all. Remember, all input energy from your power amplifier that is “used up” vibrating cabinet panels and flapping planars is not doing what it was supposed to do — namely play music.

I hope you won't mind if I take the remaining space to tell you about some **much less expensive high performance CD players we are now producing — the Fet Three CD Player at \$295.00 complete, and the Fet Three Plus CD Player at \$495.00 complete.**

Essentially, our Fet Three technology is based upon vastly improved op-amp devices that have about five times the speed of anything we have evaluated or used in the past. Much more important, and not ascertainable from the engineering data books, they have **incredible overload performance.** These devices simply do not “break up” even when driven into hard output clipping with very high frequency square waves. The improvement in performance is pretty astonishing — things that used to get strained and hard simple don't any more, and definition is way up too. They are great CD filter driver devices and that is where we are using them (with appropriate passive parts changes). The Fet Three CD Player sounds nicer than the expensive competition and is great value.

The Fet Three Plus hybrid modules were developed with help from a good friend of mine who engineers hearing aids. No — we didn't use mundane hearing aid circuits — we certainly did use his skill in packing circuits in tiny spaces. We are using the new super high speed and overload immune op-amps as the “front end” with our current amplifier devices as output stages, giving ultra fast and stable performance with one hundred times the current drive of op-amps alone **all packed into modules that fit directly on the original circuit boards.** This gives you our super dynamic drive capability without having to pay for new circuit boards in the CD player application. The sonic quality is very close to our best discrete circuits at a much lower price. **Call us for details.**

Frank Van Alstine

VOLUME SIX NUMBER THREE MARCH, 1987

It's the end of March and our winter weather still isn't. We are calling it the winter that wasn't because it has been an all time record combination here of mild and dry. The cross-country ski system warming house in Burnsville was open all of three days. The ice is gone from our rivers already, and the grass is turning green. People are starting to think about their automobile audio systems again.

You are due an update on the status of my high fidelity mobile system project using the B&W MASS speakers and the Hafler MA-1 car amplifier previously discussed herein. My project had been on "hold" pending evaluations of decent source hardware – a great power amp and speakers are not too useful without a decent signal fed into them. Audio cassette is not a good source technology, and audio FM reception leaves much to be desired too – I cannot make my FM circuits small enough to fit in a car – yet! Thus, I was taking a hard look at a car CD unit. There were several problems:

They are expensive! You really need an assistant along to run the complex things and handle the CDs. Their presence in the dashboard says "steal me" – not the way to keep the Quattro in better than new condition for a few more years. Where do you store CDs in a car without warping them? I saw only one decent answer, and that was the most expensive, the Sony Disk Jockey.

The Disk Jockey solves most problems regarding mobile CD use. It goes in the trunk and is pre-loaded with 10 CDs solving the storage and handling problem. The control panel is a thin Velcro "stick-on" which can be unstuck and hidden when you park. If a crook cannot see it, he doesn't know it is there to steal. A decent FM module is available for the unit too, or, it will interface with many existing FM - Cassette heads. According to Satch Carlson, the *Autoweek* writer who I supplied a Hafler car amp and B&W MASS speakers for, the Sony has great tractability – it kept on playing in his rally Saab on Alaskan roads that make New York City pot-holes look smooth. If only it didn't cost \$1000 plus installation plus the FM module, plus the interface module for the existing car head, plus I would really need two Hafler car amps, not one, and you know, this is more money than most of us ever spend on a home system – in fact more than most of us used to spend on the whole automobile! The other problem is that it takes up a pretty good chunk of trunk space, and I simply don't have the space to spare in the Audi (no – it doesn't "jump backwards" all by itself – nor does any other Audi – that is a driver error problem pure and simple – people simply will not admit when they are wrong in this day and age and are unwilling to take responsibility for their own actions).

Anyway, the cost and complexity of the car CD system has kept me from progressing – especially since a probably better car format is almost upon us – the DAT system.

By the time you read this the first home DAT (digital audio tape) systems will be on sale (for about \$1500 or so) in your area. These are purpose dedicated machines, not the combination video recorder and digital processor that I

have been using (and telling you about) for the past several months. They are, of course, simply a smaller version of that very same thing – a tiny revolving head video type recorder mechanism combined with digital audio processing circuits all in one analog tape recorder size package.

The tape size is 4 mm – smaller by far than existing video, audio, or 8 mm video tape (and not compatible with any other format – although there are Korean 4 mm portable video cam-corders coming using the new 4 mm digital audio tape to add to the confusion).

This is a 16 bit x 44 kHz (or thereabouts) system which could be compatible with direct digital CD data but probably won't be because of industry fear of letting you make too good a copy. For best possible results, you would simply go out the digital port on your CD player into a digital input on the DAT and make a direct digital clone – bypassing the A to D and D to A converters in both machines. Prototypes have been demonstrated at Asian trade shows with this capability. However, in the interest of screwing you, the end user, the Japanese suppliers likely will not let you have machines with that capability. Speaking of Japanese suppliers, did you see the bumper sticker on the back of the Yugo reading "We didn't bomb Pearl Harbor"? In fact, in the U.S.A., some sort of anti-copy coding is likely to be built into CDs built in the future. Several methods have been proposed.

The most "scary" is an idea to build a huge frequency chop into your music – a "bite" taken out centered around 3000 Hz – right in the middle of the mid-range! It is claimed that if the notch is narrow enough (done with very steep filters) that you "won't hear it." When your DAT scans your CD and notes the missing frequencies, it won't let you record at all. This is a really clever idea – copy protect CDs by screwing up the music so badly you won't want them in the first place – all of them.

It looks like more rational minds may prevail now, and the mid-range notch filter idea probably will not be executed. However, another scheme exists that adds "anti-copy" data to the addressing information built into your CDs. When your DAT reads your CD data, if it sees the anti-copy flags then it won't let you make a tape.

I think the industry is getting a bit carried away in building and trying to sell "anti-tape-recording" machines. If you cannot use a DAT to tape with, what are you supposed to do with it anyway?

Oh well, the above schemes all exist to prevent you from making direct digital copies. You can still go out the audio outputs of your CD player into the audio inputs of the DAT and still get

tapes of CDs of much higher quality and musicality than is possible with home analog tape recorders – which gets me back to my car project.

Soon after home DATs show up, the automobile DATs will follow – they are tooled up already and will fit in your dash. Now, when I can dub my CDs to DAT for the car, get 2 - 3 hours of music per tape of super quality, and have something easy to use while driving, with no worries about tracking over bumps or scratching or warping good CDs, I might be interested. Hang in there a bit longer. We will get a high fidelity automobile system completed before long.

I noted earlier herein that Audi has a problem – people claiming that certain models "run away" from them at full speed even when they have the brakes hard on – a problem that simply physically **cannot occur**. We keep getting equipment back to repair and get far too many calls about equipment having the same kind of **impossible problems**.

We want our equipment to work reliably and musically for you.

We want you to be happy with our equipment and your audio system.

We want you to get your money's worth and to value our services.

We want to be able to take care of any possible problem with your system very promptly, at the lowest possible cost to you (and us), and to do it right the first time.

We cannot achieve any of these goals when you give us bad data and then will not admit you made a mistake!

When you tell us your amplifier "always hums" when that simply is not true – how do you expect us to help you find the real cause of the problem?

When you absolutely insist that your tape recorders are properly connected and refuse to check again, how can we help you remove the feedback loop you caused by connecting your tape recorders in backwards?

When you tell us there is nothing connected to your amplifier except your loudspeakers, how can we guide you to remove the shorted out speaker level control from your loudspeaker wires that keeps blowing your amplifier fuses?

When you send us back your new CD player (unauthorized, of course) along with a very nasty letter telling us how distorted it is – how can we guide you to try again – only this time connecting it properly to a spare or CD input – not to a phono input? How can we fix it when there is nothing wrong with it? Certainly you are not satisfied and yes we did refund your money (less 15%). But would it not have cost

you less and given you better satisfaction to simply ask us how to connect it before leaping to the conclusion we were bad people and writing that nasty letter?

When you return your new FM tuner because it has no output on some stations (of course not – when mistuned between stations with the mute circuits on) **wouldn't it have been a lot easier to read the directions first?**

Cars “run away” because the driver does something really stupid – namely mistakenly hitting the gas instead of the brakes and then panicking and “freezing.” I know – I have done it (not with an Audi) – fortunately with the time and room to overcome complete “brain fade” and be able to think to myself later, “that was really stupid,” without hurting anything or anyone.

However, the refusal of the user to admit error may destroy Audi in the marketplace, and unjustly remove a valuable product from your consideration.

Likewise, the same refusal to admit error makes it very difficult for us to provide you with the best possible service, advice and product. When we are tied up bench testing equipment that has no problems we are not promptly servicing equipment that does need our attention. When our phone lines are busy placating people who won't tell us that their hum only occurs when they use a hair dryer on the same circuit then we are not available for somebody who does need our help.

We read big articles in *Time* magazine with lots of arm waving regarding “lack of quality service” in this day and age. I wonder, do people really want good service and expert help, or do they just want their pre-determined notions sanctioned?

You subscribe to *Audio Basics* in order to learn how to have a better working and sounding audio system. Probably the least expensive thing you can do to have a good sounding and reliable system is to use it properly – read the directions! Follow the directions. Make no unfounded assumptions. Read the directions again. You have made an investment into well executed technology – technology that demands your care and attention. Get the most out of your investment – learn how to use your equipment properly and to its best capability.

I still get many letters and calls asking the same tired old questions. What speaker wire and cable brands do you recommend? What wires sound best? Should I use really long interconnect cables between my preamp and amplifier(s) with the amps placed close to the speakers so that I can use really short speaker wires? I have covered this in the past, but it is necessary to repeat myself once in a while for new readers.

I cannot hear any difference (under double blind conditions) between any brands or types of speaker wires or connection cables that cannot be assigned to real electronic load (or shielding) differences, and usually, the differences due to strange and expensive construction methods are bad! For example:

If you change to interconnect cables that have no RFI shielding (such as 300 ohm flat wires) then you inject much more out of band high frequency garbage into your equipment. If your equipment is not very carefully designed to reject out of band garbage, the excess ultrasonic trash will change the sound of your equipment. Your equipment will slew limit and distort. It will sound different. If you like the results, be my guest.

If you attach low inductance speaker wires to many amplifiers (not ours) then the isolation from capacitive loads is reduced. Many amplifiers are absolutely unstable when directly attached to capacitive loads (such as speaker crossovers and electrostatics) and go into full bore oscillations and burn up. When the amplifier goes up in smoke and flames, the smoldering slag-pile remaining does sound different. It does not have any output at all. Thus, I can then hear the difference between inductive and non-inductive speaker wires on competitor's amplifiers – the one still playing is not using non-inductive speaker wires. With our amplifiers, which are designed to drive real world loads, the choice of speaker wires makes no difference at all.

Amplifiers are (at least ours are and all are supposed to be) designed to drive loads – namely loudspeakers. Preamplifiers are not designed to drive difficult external loads (except for our Fet Three Plus and Transcendence hybrid current buffer designs). Preamplifiers are normally simple voltage amplifiers. A speaker wire is not a difficult load for an amplifier to drive especially when compared to the very difficult load the loudspeaker represents. An interconnect cable connected to the output of the preamplifier, and the amplifier input impedance connected at the other end can be a very nasty load indeed.

Making the interconnect cable between the preamplifier and the amplifier much longer increases the distributed capacitance of the cable (which is proportional to the cable length) and this added capacitive load to the output of your preamplifier does two very bad things:

1. The additional capacitive load, combined with the input impedance of your amplifier forms a low filter – rolling off all the high frequencies. The bigger the capacitive load on the preamp, the sooner the highs are rolled off. This is not a wonderful thing to do if you want unaltered high frequencies. Fanatic audiophiles pay thousands for

equipment with highs extending flat to regions only bats could appreciate, and then turn right around and pay hundreds more for long high capacitance interconnect cables that eliminate all the highs again – and claim the results sound just wonderful. I suggest that these results are just stupid!

2. The additional capacitive load must be charged and discharged each cycle of signal by the output circuits of your preamplifier. This requires current – electron flow. Your preamp output stage probably does not have any current to spare (signal vacuum tubes only put out 3 milliamps of current). As the capacitive load attached to the output of your preamp gets bigger, the chances that your preamp will run out of necessary current drive increase. When the preamp current limits, the distortion goes to 100% for that part of the duty cycle for which the current available is less than the current demanded by the load. Long interconnect cables greatly increase the distortion generated by your system. This is not my idea of the way to get better sound.

Thus, when you change your system configuration to use very long interconnect cables (which greatly increase distortion and roll off all the highs) and very short speaker wires (which may reduce capacitive isolation for your amplifier and drive it towards oscillation) you will definitely change the sound of your system. You will make it much worse!

Why then is this exactly what the esoteric “golden ears” recommend that you do? Could it be that they don't know what they are talking about at all? Think about it.

But, you tell me, you like the sound of your system configured that way. Fine, I say, all that means is that you really like rolled off highs, increased distortion, and oscillations in your system. You have the right to like that. (Some people really like giant Boom Boxes turned up to full distortion best of all too.) Please, please, please, however, don't try and tell me that what you like after obviously increasing the distortion in your system is “better.” And don't bother telling me that the extra money you spent for those expensive long interconnect cables was a good investment – it was money burned up.

The little electrons don't know how much you paid for your speaker wires and cables and they didn't read the advertising sheets.

Expensive wires and cables are at best placebos, and at the worst are distortion increasing garbage. They always interfere with advancements in the state of audio engineering by misdirecting resources away from science and engineering and towards witchcraft. Every time

people go that way, in any field of endeavor, looking for and believing those “something for nothing” promises of the magicians, they get nothing for something. Why, why, why do it again?

There seems to be a growing amount of confusion out there regarding the B&W Matrix line of loudspeakers, especially among those of you with subscriptions to European audio magazines. B&W is now producing an extension to the Matrix line, an E (European or Esoteric) version of these speakers, namely the Matrix 1E, the 2E, and the 3E. These “E” speakers are not being imported into North America.

It appears that B&W has made a marketing error and is starting to pay too much attention to the British Hi-Fi press, which is rapidly drifting away from rationality and engineering and toward purple prose, magic, and authoritarian nonsense like much of the U.S. “underground” press. In England, there remains no moderation in the audio press at all. Evidently, the first generation of Matrix speakers were not esoteric enough for the British hi-fi fanatics. Although they were made with Van den Hull wiring inside – once you go down that path of appeasement of the audiophiles, you can never go far enough.

So, to make British editors happy, B&W did a second generation Matrix series, with dual input terminals for “bi-wiring” (don’t ask ! !) different loading on the woofers, more efficient (but less power handling) tweeters, and so on. Now the British press is happier because B&W re-did it “their way.”

The U.S. importer, Anglo-American Audio, isn’t happy at all because the “E” speakers are much more expensive and essentially require doubling of inventory from nine versions counting all available finishes to eighteen versions – simply too many! If the “E” Matrix speakers were simply better in all respects than the original, then the problem is resolved as the originals would be discontinued. But, they are not, and the originals are not discontinued.

The original Matrix speakers handle much more power (important here, not as important in small British listening rooms with anemic English amplifiers) and are better tuned acoustically to our larger rooms. I had a very long, and very frank talk with people I trust at Anglo-American Audio. They know I like the Matrix 1, but am not impressed with the 2 or 3. They know that what I want is an improved 2 and 3 combining the best characteristics of the 2 and 3 with the best characteristics of the discontinued 2000 and 3000. We agree that this is the goal. The write ups in the British press on the Matrix “E” series speakers would lead a reader to believe that this is exactly what the “E” speakers offer. It isn’t! They are somewhat

different, but not better, than the standard Matrix series, but are much more expensive. The judgement of the U.S. importer is to continue to offer the standard Matrix series as the best value, and to not confuse the market with the higher priced, but simply different “E” Matrix speakers. I agree. Hopefully, this situation is temporary. B&W knows they have work to do to perfect the Matrix concept in their larger speakers. I expect better things from them in the future. Meanwhile, the 802F Special remains a simply awesome loudspeaker in the upper quality range of loudspeakers.

CRASS COMMERCIAL ANNOUNCEMENTS.

I have completely re-written our catalog to reflect the upgraded products (FET THREE and FET THREE PLUS). This catalog has the same cover photo as the September 1, 1986 version, but is dated February 1, 1987 and it shows a completely upgraded product listing, including prices for the B&W loudspeakers we sell. Note that there are several new enhanced quality but much lower priced products, such as the Fet Three and Fet Three Plus DH-100 and DH-110 preamp circuits, the Fet Three and Fet Three Plus DH-330 tuner circuits, and the Fet Three Plus hybrid modules for all Philips CD players. In addition the Mos-Fet 280C and 400C amplifiers are discussed, along with the Fet Three Plus version of the control amplifier. There are many new useful products with enhanced function, value, and musicality.

For example, we now offer a Fet Three Plus phase inverter board – a stereo hybrid inverter circuit that can allow you to directly bridge for super high power mono operation, any common ground amplifier. The phase inverter goes inside your preamp and works outrageously well. It is \$100.00 (installed by us only).

In addition (not part of the regular catalog) I have prepared a comprehensive UPGRADE PRICE LIST showing your cost to upgrade all possible old designs of ours to our current quality standards.

The new catalog and the new upgrade price list are available right now – write us if you want them. Thanks for your interest.

Frank Van Alstine

VOLUME SIX NUMBER FOUR APRIL, 1987

This is being brought to you on the old electronic typewriter this month, instead of on the ultra-modern super computer because the time savings on the ultra computer are not so great when it crashes, burns, and loses four pages of what I am trying to say. Then, when it gets a case of terminal glitches while I am trying to compose this on a Sunday afternoon (phone

doesn’t ring then) after suffering from two weeks of writer’s block, I start getting the feeling I would be better off feeding it a brick rather than another floppy. Anyway, I do have lots of interesting things to inform you about this month, so we better get started.

Let’s start with the **B&W Videotape**. I have received a videotape from B&W which contains their 1985 and 1986 C.E.S. Show presentations (a detailed look at their loudspeaker lines) and a good look at the B&W factory and research centers in England. I would be happy to make you a dub of this tape (either VHS or Beta). All you need to do if you want a copy is to send me a high quality blank video tape and \$10.00 to cover my son’s time to run the video machines and return postage. It is an interesting look at B&W with much more fact than arm-waving.

I have been playing with an interesting and effective new product this month – **ECHO-MUFFS** from Watkins Engineering, 1019 East Center Street, Kingsport, Tennessee 37660, phone (615) 246-3701. Echo-Muffs are kind of portable anechoic chambers—sound absorbers to tame room reflections. For people trying to get neutral and high resolution sound in a bright, reflective, and “boxy” sounding room, who cannot do anything permanent to the room itself, and don’t have the choice available to move the system to a better room, Echo-muffs probably will be the best thing (perhaps the only thing) they can add to their system that will really make it sound a lot better.

The Echo-Muffs are large U-shaped acoustic foam sound absorbers designed to be placed behind your loudspeakers. They are free standing, four inches thick, forty inches wide, forty-six inches high, and are beige in color. They cost \$199.00 a pair at this time, but may be going up in price soon. There are “half Muffs” available too—identical to the big ones, but half as high for \$129.00 a pair. Obviously, you can stack a regular Echo-Muff with a half Muff for use with very tall loudspeakers such as Acoustats, Magnaplanars, and Apogees. Your loudspeakers are placed inside the “U” formed by the Echo-Muff and then acoustic output from the sides and rear of the system is attenuated, and acoustic reflections from your walls are inhibited.

Since all acoustic output from the sides and back of your loudspeaker cabinets is wrong, and since all reflections from your room are wrong (we want to hear only the acoustic space of the performance and your room was not part of that) anything you can do to rid the playback performance of these reflections and resonances improves the fidelity. The Echo-Muffs really do gobble up these reflections and resonances.

If you talk into them, it does sound much like you have entered an anechoic chamber—and a rationally priced and portable chamber at that.

Are there any catches? Yes, there are. Although the Echo-Muffs are less expensive than the amount of Sonex bonded to your walls necessary to do the same job, they will still have a substantial visual impact on your system when they are being used. The good news is that they can be “stashed away” when you are not seriously using the system. The bad news is that they will take plenty of stashing space. The other catch is that they will change the sound of your system and you may not like that change, even if it is better. Many of us have gotten used to the “sound” of our listening rooms and if Echo-Muffs gets rid of that “sound” we may be unhappy with the results. Certainly, the elimination of your local “impurities” may take a bit of getting used to.

In a really good (dead) room with really non-resonant speakers (like B&W Matrix 1s) the benefits of Echo-Muffs may be marginal. But many unlistenable rooms will be really improved with them. I have one sample pair available now at the \$199 price (delivered in the continental U.S.A.). You should call Watkins Engineering to see if there is a dealer for them in your area. This is a product I can recommend because it does what it claims, what it does is useful, it is worth the money, and it can help make your system better, not just different.

We have got another improved product line to tell you about – **the new B&W “i” series loudspeakers – the 100i, the 110i, the 220i, and the 330i models** at no increase in price (at least not until after June 1, 1987).

The “i” stands for **improved** in these applications. What is improved most obviously is the cabinet finish. While these models are still budget priced with vinyl finished cabinets, the vinyl finish has been much upgraded and now “really looks like real wood” – almost, honest! It really is very nice with black grill clothes on all finishes and bolder and more attractive B&W logos. All models are fused to help prevent “party” problems. In addition, the crossovers have been improved. B&W tells us that the power handling of the inductors has been upgraded. Cabinets are more rigid (and exhibit even less resonances and colorations than before) and improved production methods have yielded even tighter sample to sample performance characteristics – especially better tweeter performance.

I have evaluated the 110i and 330i models so far and both are better loudspeakers than ever. I hear improved definition, reduced coloration, and better transient dynamics. These are subtle improvements in sonic quality, not big changes that a owner of the previous genera-

tion products should worry about. Certainly there is more change in looks than in performance and I would not advise the owner of a current production 100 series speaker to “trade sideways” as the cost to do so would not be cost effective enough to be good value. Also, all of the electrical (and sonic) improvements have already been slowly phased into production over the past several months, unannounced, in the standard 100 series line. So, if you have purchased any of the 100 series speakers from a dealer with fresh stock (us, for example), you already will have all the upgrades except the cabinet finish. If your speaker has the back panel fuseholders, it has all the important engineering advances. But for those of you still thinking about a new loudspeaker system, the 100 series B&W products are now better values than ever. I personally think that the 330i is a great stopping place for about 90% of you. With our CA-50 Plus mos-fet control amplifier, you can have a true audiophile quality system in every respect for less than the cost of some esoteric phono cartridges.

I just received a shipment of the new B&W “i” series brochures. Write or call me if you would like us to send you one.

Now it is time for an audio equipment use lesson.

The lesson today is the **name and function of inputs**. It is time to discuss this because I am getting more frequent calls and letters from clients who don’t know what to do – they want to get a CD player but their receiver, preamp, or control amplifier does not have any “CD” inputs. Do they have to buy a new unit? No, there are all kinds of inputs you can use for CD – such as Line, Spare, Aux, AM-FM, Tuner, TV, and even EPL In. The only thing you can’t use is Phono.

Actually there are only two different kinds of preamp inputs (and the necessary circuits to support them) – Phono and Line. Lets look closer at both.

PHONO is one class of input (along with its moving coil phono sub-class). The output of a magnetic phono cartridge as driven by an RIAA equalized phonograph record (all modern records since 78 rpm days) is very low level and does not have “flat” frequency response. Because it takes “work” to produce an electrical signal, it is obvious that it takes a lot more work to produce a large signal than a small one. The way a record produces an electrical signal is to vibrate the stylus of the phono cartridge back and forth. If one tried to produce a large electrical signal doing this, one would have to vibrate the stylus a large amount, with big grooves, only a few minutes playing time per side, and with lots of mistracking distortion.

That is the way it used to be done in the 78 rpm days with crystal or ceramic cartridges and nails for stylus assemblies.

If one wants low distortion performance from the vibration system, one must keep the vibrations (and electrical output) small. One must also “pre-squash” the bass vibrations because they would otherwise be much larger, and thus cause much more distortion than the high frequency vibrations. This is what RIAA phono equalization is for. It scrunches the bass part of the signal down in size in the recording process to keep the bass vibrations within reasonable bounds for low distortion tracking of the finished record.

Thus the PHONO sections of your equipment has several jobs to do at the same time:

It must “un-scrunch” the pre-squashed bass signals. This it does by applying RIAA playback equalization to the signal coming from the phono cartridge. To simplify, the phono preamplifier boosts the bass parts of the signals about ten times in relation to the mid-range, and also shapes the high frequencies too, to accommodate the actual response capability of the magnetic phono cartridge.

It must amplify the signal a whole bunch, because the output of the phono cartridge is much lower in level than the output from any other sources. The signal is amplified by about a factor of one-hundred to be useful to drive the volume and balance controls, tape recorders, and the line sections of the equipment.

It must present a proper input load for the phono cartridge. Because the cartridge is a passive and inductive device, its frequency response will be profoundly affected by the load it looks into. The phono inputs must be the correct load for the phono cartridge.

MOVING COIL phono inputs must amplify the signal by another factor of ten because the electrical signal of moving coil cartridges is abnormally low (you can’t get much output out of the coils wound on the stylus itself because the coils must be very small to keep the assembly from mistracking badly).

Since one cannot make a high quality audio section that handles both large and small signals well at the same time, and that has flat response and equalized response at the same time, the PHONO inputs and circuits are dedicated for, and only for, low level, RIAA pre-equalized signals. Feeding the output from any other source into Phono inputs will only cause non-linear response, overload, and lots of distortion.

All other analog input signals common for a home audio system can be classified together as LINE LEVEL source signals. The signals from FM and or AM Tuners, Tape Decks (including DATs), CD Players, Stereo VCRs, and TV sound all are essentially identical electrical sources with the following common characteristics:

All LINE LEVEL signals are higher level signals (typically 0.5 to 2 volts output as compared to 0.005 volts typical for a Phono signal).

All Line Level signals are driven from active (and hopefully low output impedance) sources that if executed properly, are much less sensitive to load impedance variations than Phono sources are. Thus, Line Level sources can drive into a wider variety of input impedances (10,000 Ω to 100,000 Ω typically) without loading down and without frequency response variations.

Note that vacuum tube voltage gain stages have much higher output impedances than solid state gain stages do, and are much more load sensitive. While a solid state phono preamplifier may drive many feet of connection cable and several tape inputs, a vacuum tube phono stage probably will load down into more than one tape input, and exhibit frequency response irregularities if the interconnect cables are more than 2 - 3 feet long.

It does not matter what name the line level inputs are given on your equipment, they can all be used interchangeably. And, obviously then there is nothing special at all about CD Inputs. They are identical to all the other line level inputs.

The typical names given to your line level inputs are **SPARE, AUX, TUNER, TV, FM, FM-MPLX, VCR, FM-AM, CD, and LINE. These can all be used interchangeably.**

In addition, on equipment with a switchable **External Processor Loop**, the **EPL IN** jacks can be used for an additional set of Line Level inputs if your others are used up (PAT-5 and DH-110 owners take note!).

TAPE or RECORDING INPUTS are slightly different electrically. It is normal practice in selector switch design in audio equipment to short unused inputs to reduce crosstalk between sources. Audio sources are designed to tolerate shorts across their line level (not loud-speaker) outputs. However, because Tape Inputs are used at the same time as other source inputs for tape monitoring purposes, it is normal practice to not short or ground out unused tape inputs. Thus, if you use a Tape Input for a CD player or FM tuner, you may get more

crosstalk when switched away from that source. Note also that some VCRs (primarily products made several years ago) were not designed to tolerate shorted audio outputs. If they are connected to a line level input in your audio system, it is possible to damage the audio output stages of the VCR if it is shorted out by the selector switch convention in your audio equipment. **Check with the manufacturer of your VCR** to assure that it is safe to use it in a mode that may short its audio outputs before connecting it to your hi-fi system.

Some people are worried about the high signal level from a CD player overloading your line stage circuits in your receiver or preamplifier. Don't worry, this cannot happen. The volume and balance controls in your preamp or receiver are ahead of the line circuits. Thus, the input from the CD player is attenuated before it gets to your active circuits, and amplitude overload cannot happen. Again, there is nothing magic about CD inputs.

Transient overload of your line stage by your CD player can happen because this is a slew rate and design problem, not an amplitude clipping problem. We resolve this with Audio by Van Alstine equipment with line stages that are not subject to transient overload for excessive external signals. What your equipment may do, who knows, but if your CD playback sounds harsh, transient overload probably is occurring, and will occur independently of what your inputs are named.

I have just finished the design and tooling of a new low cost product that many of you are going to really like – **a modern, high quality, and properly spaced input-output jack set for the Dyna PAT-5 chassis (for stock units or those with any of our circuit sets).**

The new jack set is available to you three ways:

1. A \$50.00 **do-it-yourself kit** including all necessary parts and directions.
2. A \$75.00 option installed here when your PAT-5 based preamp is here for any other electrical work or when we are building you a new A.V.A. preamp.
3. A \$100.00 project if you want us to install the new jack set independently of any other work done to your preamp.

These prices include shipping to you in the continental U.S.A.

The jack set consists of a 6.5" x 3.5" RG4 flow soldered circuit board, precision drilled to accept twenty-four new Switchcraft machined RCA jacks. The jacks are spaced on 0.5" centers to insure that modern connection cables will not interfere with each other. The original four jack strips are removed, the metal divider between the Spare and EPL In positions is removed, and then the new board fits perfectly

inside the chassis. The board can be supplied with either one or two sets of isolated ground phono inputs, **so, if ordering the do-it-yourself kit you must tell us if your preamp is set up with Phono 2 as a phono or line level input.** It will only be a line level input set if your preamp has our own new custom selector switch or is a very recent S.C.C. kit.

Of course the kit includes twenty-four new Switchcraft jacks, and all necessary mounting hardware and instructions. You must know how to solder because you will have to connect all the original jack wiring to the new jack set. We will have our first production run back from our PC card house by the time you read this. So if you are getting tired of the scrunched together connections on your PAT-5 chassis and want something a lot nicer, now is the time to order. We even include a Thumbscrew phono ground.

I know many of you don't want me to spend much time talking about **video products** but I would like to take the remaining space to **warn you that when you buy a VHS VCR, unless you are very careful, you may not get the kind of audio capability you wanted.** Unlike Beta (where Beta Hi-Fi gives you everything), VHS has several iterations of stereo and "hi-fi" sound, most versions being quite useless.

For example **"Dolby Stereo"** on a VHS machine is **not high fidelity at all!** It consists of two low-fi sound tracks on the slow speed fixed head, with the noise to signal ratio fixed up a bit with Dolby. It is worse sound than an old 8-track. "MTS/SAP Stereo" won't give you high fidelity stereo tape playback either, this is a circuit that decodes broadcast TV stereo sound (available on only a few broadcast stations) with fidelity worse than most commercial FM broadcasts. If you want stereo hi-fidelity tape playback, you must look for an HQ VHS machine with **"VHS HI-FI"** sound circuits. This is the sound system that uses additional heads to record and playback stereo high fidelity sound from the high speed video heads. If you want to be able to **record stereo high-fidelity audio** with your VHS machine, you must get a **Hi-Fi** model that has recording meters and input level controls – otherwise you will have automatic level control circuits and compressed sound. Each of these circuit functions is independent of the others and may or may not be available on the machine you are looking at. Be sure of what you are getting before you buy.

Frank Van Alstine

VOLUME SIX NUMBER FIVE MAY, 1987

Well, we finally made the “big time.” If you do not subscribe to *Audio* magazine, I urge you to buy a copy of the June, 1987 issue while it is now on the newsstand. There, right before your eyes, is the Audio by Van Alstine Transcendence 250 amplifier mentioned on the cover (pleasing sound), and with a full review by Leonard Feldman (pp. 118 - 122) saying all kinds of kind things about us and the amplifier.

When Leonard Feldman says, “The more I listened to this outstanding amplifier, the more I came to believe that Van Alstine is my kind of amplifier designer,” you better believe that this really makes me feel good. Actually, I was really pleased with the review because of its accuracy. Mr. Feldman obviously has an extraordinary ability to get to the heart of a product, and its design philosophy, very quickly and accurately. Certainly he gives you more useful information in this thorough three page article (with just one simple but meaningful closing paragraph about his subjective impressions) than twenty pages of underground magazine purple prose ever tells me about any audio product.

I get the feeling that Mr. Feldman was pretty pleased to find an amplifier that had some extraordinary capabilities on the test bench and that sounded that way in the audio system too. I bet it doesn't happen to him very often.

Interestingly enough, this review shows how well the editorial and advertising branches of *Audio* are isolated from each other – there is no editorial conflict of interest operating at all. I do not advertise in *Audio* (its classified ad section has gotten a little too “flaky” for me – my ads getting lost between the Wonder Caps and the Magic Bricks – although maybe I better try again to follow up on this review). I was not asked to advertise. I have never had any direct contact with Mr. Feldman other than to send him the engineering specifications for the amplifier – I have only met him once, very briefly, at a C.E.S. show. *Audio* did send me a preview of the first two pages of the review so I could check for accuracy (they actually care about accuracy – not many journalists do any more) but I first saw the sections on measurements and use and listening tests when my subscription issue came. Assuming that Mr. Feldman treats all products the way he did ours, and I see no reason why he wouldn't, then here is one reviewer you can really trust. And, since his evaluations are based upon the engineering merits first (arm waving alone won't cut it) then they have a good chance of being consistent. I honestly didn't think that the big, bad, commercial press was that honest and

accurate. Watching their review process happen with our product has been an eye opening experience for me. They did it right.

In contrast, when I sent the Super Pas to *Stereophile* a couple of years ago, I got a call back telling me it was just wonderful, a mention in the recommended components list that a review was coming, and then a bombardment from *Stereophile*'s advertising people to buy display advertising therein. I didn't! The Super Pas was not reviewed.

J. Gordon Holt claims to have founded *Stereophile* because he was disgusted with the conflict of interest between the advertising and editorial departments of the commercial high fidelity publications. Well, he better look at his own operation first now. The evidence we see is that it is *Stereophile* that is advertiser driven while *Audio* pursues an ethical editorial policy. What does this tell you?

Speaking of ethics, I want to inform you of two interesting bits of data I have regarding the Nakamichi OMS-5 and OMS-7 Compact Disc players. First of all, I have the Nakamichi advertising literature for these players. Under specifications, they say, “16-bit linear quantization.” I also have the schematic diagrams for these machines. The logic and D to A large scale integrated circuits used include the standard Philips TDA1540D 14-bit chip set circuits (with a slightly more complex mundane op-amp output stage than Philips uses)! That's right! Your \$1200 Nakamichi is simply an obsolete old \$99 Magnavox 1041 in disguise with a Japanese style slide rail laser driver rather than the Philips pivot arm laser.

How do they get to claim 16-bit capability when it is really a 14-bit machine? There is only one way to do it that I know of – lie about it! And if Nakamichi will blatantly lie to you about their specifications in this case, and there is a difference between 14-bit and 16-bit performance, then when, if ever, will they tell you the truth? And if this upstanding and respected Japanese company resorts to utter falsehood and deception to represent their products, then what lesser Japanese company can you trust? What is going on here, and why?

Now, for a TWEETER SAVING WARNING! We are, unfortunately, starting to hear from some of you who have found a new and interesting way to destroy the tweeters in your loudspeakers – namely by using Compact Disc test tones. You have purchased one of the several CDs chock full of interesting test tones – square waves, frequency sweeps, impulse signals, sine waves, white noise, etc. You have been trying the CDs out on your system, and when you find that you “can't hear” the 10,000 Hz, 15,000 Hz, or 20,000 Hz signals, you are cranking up the volume until you can hear

them. Unfortunately, you still cannot hear these tones – but you then do smell them – the smell of tweeters catching on fire and burning up!

20,000 Hz doesn't smell good! It smells like plastic burning! What is happening here is that you, for the first time, have an accurate high amplitude, pure high frequency signal to kill your system with. In the old days, there were some test records with high frequency sine waves, but almost all cartridges gave up trying to play them and simply gouged them out of the record at the first pass – you really didn't have any speaker damaging information left to send to the system. With a CD, however, all the information is accurately dumped into your system whether it can handle it or not.

Your system simply cannot handle high level, high frequency test tones. The typical tweeter handles about 5 watts of power, maximum, independently of any loudspeaker system manufacturer's claims. In a loudspeaker system, under music conditions, the tweeter does not have to handle the full power of the amplifier. The crossover network divides the power from the amplifier, and only the small portion that is really high frequencies is sent on to the tweeter. In music, probably less than 2% of the frequencies and power involved actually get to the tweeters, so that a 5 watt tweeter can easily handle the typical musical power of a 200 watt full range signal.

In addition, in real music, the high frequencies have a very short time duration, so the tweeter rarely has to handle sustained tones. Observe that what you assume you are hearing as “highs” – the top notes of the flute, piano, cymbals, etc. are actually “mid-range” sounds – 2,000 to 4,000 Hz information. The real highs are the harmonic overtones of these notes, way down in level and power from the fundamentals. Tones of much over 10,000 Hz don't really have much “tone” at all, more of a sharp “hiss” quality than any musical value.

Anyway, when you send a very high frequency sustained test signal to your loudspeakers, several very bad things happen. First of all since all of the signal is now a simple very high frequency tone, all of the signal is sent straight through the crossover directly to your tweeters. A hundred watts of 20,000 Hz sine wave in means 100 watts fed directly to your 5 watt rated tweeter – voila! – instant fried tweeter! Second, since there is a very good chance that you cannot hear 20,000 Hz at all, then you will put the test signal in, hear nothing coming out, and then crank up the volume until you can hear it – guaranteeing that you do put all 100 watts into the tweeter. Finally, even if the tweeter does handle the overload for a short time, you are making it try to cope for a long time – several seconds, at least – and there is no way any tweeter is going to take this abuse

without going up in smoke and flames. How much heat is a hundred watts, you ask? Here is an experiment to show you, **BUT DON'T TRY IT, JUST THINK ABOUT IT.** Turn on a 100 watt light bulb, wait for it to warm up, and then firmly hold onto it, while lit! After treating your third degree burns, contemplate what that much heat would do if dumped into your tweeters. Contemplate also your speaker manufacturer's power rating specifications. It goes "tilt" doesn't it?

Note that even if your speaker systems are electronically protected or fused, sustained high frequency test tones are apt to damage them. The problem is that the protection circuits are set to allow the speaker to have adequate output on normal music in which highs are of short duration and are only a small part of the overall power of the music. Test tones will blow the tweeters far quicker than the response time of nearly all protection fuses or circuits. Don't do it! Don't run CD test tones through your system except at very low signal levels and do remember that the system damaging very high frequencies are there, even if you cannot hear them.

Another common cause of accidental system damage is **IMPROPER USE OF YOUR TAPE MONITOR SWITCHING CAPABILITIES.**

Tape Monitor switches are a necessary evil in your system to allow you to monitor the ongoing quality of a tape recording you are making. I call the tape monitor switch a necessary evil because it also gives you the opportunity to make many costly mistakes when using the system.

The most common mistake made in using the tape monitor switch is not noticing that it is switched to the "tape" position when you are starting up the system, but are not using the tape recorder. Then, no source played through the system, except a tape deck, will function. If you are not then using a tape deck, you won't get any sound – nothing at all out of phono, tuner, CD, or TV. Panic then sets in, brain fade occurs – the preamp is "dead" and out it comes and back in the box to U.P.S. to us for service – along with a nasty note that we build unreliable equipment. You simply cannot believe how many preamps are returned to us, unauthorized, for service because they are "dead" when the only problem is the tape monitor switch was inadvertently left in the "tape" position – can you believe three preamps back for this problem in the same day from different parts of the country?

The second most common tape monitor switch problem is accidentally making a positive feedback loop, generating a huge "squeal," and blowing up your amplifier and or loudspeakers before you can shut things down. I think these

things happen because people don't really understand what function the tape monitor really provides. So, let's explain it.

The reason a tape monitor switch is necessary is so that you can hear what you are recording while making a tape copy of other source material. In general, you use the selector switch to choose the source you want to listen to (we described the source names and functions last month herein). And, of course, the selector switch can only be set to one source at a time – it cannot be in two places at once. But, we want it to be in "two places at once" while making a tape recording so we can compare the source we are recording with the playback quality of the tape we are making. Thus, the tape monitor switch is necessary as an accessory to the main selector switch so we can select two things at once – our source program with the main switch, and at the same time, our tape recorder output so we can monitor it too.

The signal path, while making and monitoring a tape recording of another source is as follows (lets assume we are making a tape of a record in this case):

We are playing back the record, so the selector switch is set to Phono. The signal from the phono cartridge comes into the phono inputs, then through the RIAA phono preamplifier section of the preamp or receiver, and then to the selector switch. Here, it is fed to the tape outputs on your preamp, and, at the same time, to your tape monitor switch. If the tape monitor switch is set to the Input position, the signal from your phono section is sent on directly to your volume and balance controls, mono-stereo switching controls, the line and tone control circuits, and on to the power amplifier. If, however, the tape monitor switch is set to the Tape position, the phono signal is interrupted at the tape monitor switch and cannot directly get any further, as the tape monitor switch is now connected to the tape input jacks on your preamp, and is not connected to the output from the selector switch.

Now, assuming that you have a tape recorder in the record mode connected to your preamp, the signal from your phono has a different routing. Although it is interrupted at the tape monitor switch, it still appears at the tape outputs of your preamp. There, it is connected to the tape inputs on your tape recorder. If your tape recorder has three heads (separate erase, record, and playback heads) then the phono signal is sent to the record head and stuffed onto the tape. The signal is then picked up again by the playback head as the tape passes by it, sent to the tape outputs on your tape recorder, to the tape input jacks on your preamp, and to the other side of the tape monitor switch, which,

being switched to the Tape position, sends the signal on to the volume control, etc, and to the amplifier.

Thus, while recording, you can listen to the original source with the tape monitor switch set to the Input position, or to the just recorded tape with the switch set to the Tape position. Neat huh! Note that there will be a slight time delay when you switch from the input to the tape position because it takes a real amount of time for the tape to move from the record to the playback head and this time shows up as a "delay" in the playback signal in the monitor mode.

If you have a cassette deck, DAT, or PCM unit which generally do not have separate record and playback heads, the process is similar, but a bit different. Since the heads cannot be recording and playing back at the same time, when you are recording with your deck, the signal sent to the record head is what shows up at the tape outputs on your recorder, rather than the playback signal off of the tape. Thus, you can monitor only the signal being sent to your record heads, not the signal as already recorded and subsequently picked up again by the playback heads. There will be no "time delay" when switching from Input to Tape.

Now, all this switching capability makes it nice for monitoring tapes, but gives you a destruct mode capability too – namely the possibility of creating a positive feedback loop when recording. If while you are recording, with the tape monitor switch set to the Tape position, you inadvertently switch the main selector switch to its Tape position too instead of to the source position, what you have actually done is to connect the input of your tape deck to its output through the preamp's switching functions. The output of this loop is then fed downstream to the rest of your system. What happens then happens very quickly – the output of the tape deck is fed to the input signal and recorded, which adds to what was there, which is then fed out and back to the input and recorded again, causing a very rapidly growing "shriek" or "squeal," pegging meters, driving amplifiers into hard clipping, and blowing tweeters right and left. Since there is no way to avoid this destruct mode possibility and to also provide you with tape monitoring capability at the same time, the only "cure" is to understand what can happen, and to use the capabilities with care. I hope this explanation helps you out.

TRIP WARNING! ! I am planning a vacation trip in July with my family (my wife Darlene, my 19 year old daughter Vanessa, and my 17 year old son Frank Jr.) all the way to Alaska! We will be driving from Minnesota west through the northwest U.S.A. to Vancouver, B.C. to sail on the Stardancer on July 10, 1987

to arrive in Haines, Alaska on July 13th. From there we plan on looping on up to Fairbanks and then down past Mt. McKinley to Anchorage, and then we will find our way back down the Alaska Highway to Jasper, Banff, Calgary, Edmonton, and finally back home.

Obviously, Audio by Van Alstine will remain open and in business while I am gone. David Umeda and Aado Perandi will be running things as well as if I was there. Don't hesitate to do business with us while I am on vacation. I choose people who get things done right.

We will be heading to Chicago next week for the annual Consumer Electronics, Show. It is really nice to be walking in with the support of the current *Audio* review. A few more people might even know who I am, and I will try to be able to tell a string bass from a cello this year (if Krell and Apogee build a system that plays bass this year with more than table radio dynamics). We do have a lot of things to be looking at and looking for.

First of all, there are at least three new B&W loudspeakers coming, the Matrix 801 which is supposed to be an improvement over the long successful original 801, and a two piece Matrix "Mini-System" consisting of a 9" x 6" x 8" two way system and a matching 39" x 6" x 8" "Mini-Woofer" tower. The top can be used independently, I understand. Bert Whyte, in *Audio*, is very enthusiastic about these new speakers after a "preview" of them at Worthing, England. I am not going to assume anything (after my disappointment with the Matrix 2 and 3) until I can evaluate them in house here, but I will write a preliminary report herein next month.

Next, at C.E.S., I will be looking for a competent turntable - tonearm combination. It is really sad that all the high value Harman-Kardon models were discontinued and I would like something to replace them with that really works well.

We already have the new Grado "X" series cartridges, and are now using them for our Longhorn Grado production (still available for \$99 with a 30 day satisfaction guarantee). The X series Grado is an evolutionary change, with a bit nicer staging and dynamics yet. We are happy with them.

Unless B&W really comes through with better mid-priced models, I will be looking for an additional loudspeaker line. Although I am very happy with B&W value at the low end (the "i" series), with the Matrix 1, and with the high end (802, 801, and the 808), the "gap" left by the deletion of the DM 2000 and DM 3000 without adequate replacements leaves me a big hole in my product line.

I am taking my daughter, Vanessa, to the show for the first time, so I will have another pair of talented ears available and some serious freshly college trained economics skill in picking out good value. My economics training consisted only of advice from an old oriental electronics parts salesman, "buy low, sell high," and when times are bad, remind everybody of the "plight and sanctity of the family high fidelity shop" and try and get the gummit to buy all my excess production.

We have fun looking at what other electrical designers are doing and especially look for really good engineering and good performance value. I really appreciate good work, when I can find it. I hate shams and scams and complete arm-waving pseudo-science advertising claims. (The Threshold "Stasis" patent looks a lot like a Dynaco St-400 bootstrap output driver circuit to me.) We collect literature from the esoteric suppliers (the writing quality, grammar, and spelling are in general just ghastly – and I am the pot calling the kettle black). We go and search again because nearly each year we find a gem of an idea, some really clever product buried in the rough of this "zoo." It is an interesting search.

I also will be looking at the status of Digital Audio Tape Recorders (DAT). When will they be available? What price? What about automobile models? And, very important, what about proposed anti-copy schemes? Some say that audio frequency notch filters will be used on much source material, destroying the fidelity of your CDs whether you own a DAT or not. I am going to ask and talk to those in the know about this. I sure hope Renner and Woods of Telarc are not considering this approach. With much current hard rock material, who cares – or perhaps removing a lot of the material will make it sound better. Seriously, the anti-copy folks are simply blowing smoke. No scheme will work against professional pirates, they will only screw up the music and make it more expensive. These folks had better look at what VCRs have done for the movie studios – namely greatly increase their business, not damage it. DATs are not going to hurt the recording artists, they will only help spread knowledge of their talent and make it more marketable yet. I am finding my library CDs and PCM unit serves me best for hands on evaluation of source material. What I really like, I buy in CD form anyway, as it is much more convenient to use, and more durable than my digital copies. And, I am finding I am expanding my musical horizons and tastes and am buying labels and artists I wouldn't have normally looked at because the library and my PCM unit gives me such a good evaluation opportunity. Anti-copy schemes will only be anti-sales schemes in the long run – a pox on them.

Next month I will have a complete report for you on what was new and interesting at the Consumer Electronics Show in Chicago.

Frank Van Alstine

VOLUME SIX NUMBER SIX JUNE, 1987

I think it is important this month to start out with an update on the status of proposed **federal legislation to require "anti-copy chips"** in all Digital Audio Tape (DAT) recorders sold in the U.S.A. While you may not be particularly interested in owning a DAT or making your own recordings, you ought to be concerned about this legislation – for **it has the potential of destroying the fidelity of all source material for everybody – records, CDs, FM broadcast – regardless of whether you are taping or not!**

A brief review of the situation is in order. The record producing industry has been concerned, for a long time, that the home tape copying of material they produced is stealing from them, even if the consumer purchased the original copy of the source material. In the **video end of the business** the U.S. Supreme Court has decided that it is O.K. for a consumer to own a tape recorder (VCR) and use it to copy programs for his own private non-commercial use. Although the wider implications are clear, the court decision was a narrow one and did not address audio source material, only video. The music industry does not think that you have the right to use source material you purchased as you want to, but only as the music industry wants you to. I suspect they would be happiest if the record, tape, or CD you purchased "dissolved" after one play, and if you wanted to hear it a second time, you would have to go out and buy another copy.

Although the analog tape recorder has become very popular (especially the low priced and convenient audio cassette recorder) and although the recording industry has had a bonanza of profits producing and selling pre-recorded audio cassette tapes to that expanding market, they still have been unhappy about the situation. They kind of only tolerated the consumer owning a device that will record because the consumer analog tape recorder simply is a low fidelity device and makes lousy copies.

Now along comes the Digital Audio Tape recorder, in which all tape noise, tape dynamic range and transient limitations, transport noise, and all mechanical irregularities simply vanish, and the consumer finally has the opportunity to make really good copies. Now the recording industry really gets up in arms and prods their pet congressmen to get busy and

pass protective legislation – legislation now pending that can put “high fidelity” back into the stone ages.

There are two ways to make a copy of source material using digital recorders. The best way, assuming the machines are compatible, is a direct digital transfer. In this case, the digital data from the source CD or Tape is ported directly to the recording DAT. No D to A or A to D converters are used and the copy is essentially an identical clone of the source. Record producers have a right to get nervous about this, as it give pirates easy access to exact copies of the original master tapes. However, it is easy to prevent this from happening. All production DAT machines and Digital Audio Processors has “anti-copy” logic built in. All production CDs have a “don’t copy me” digital message built into their lead and address information. When the DAT reads this message, it won’t record. The **music information** is not affected.

The second way to copy with a DAT is to take the audio outputs of the source and feed it into the audio inputs of the DAT. In this case, the copy will have passed through both the D to A converters of the source and the A to D converters of the DAT.

Although the resulting tape copy is still of very high fidelity (especially when compared with the dismal quality of analog cassette copies) it is not a clone of the source as some small but audible loss occurs due to the finite limitations of the D to A and A to D converters and associated circuitry. (With my Sony PCM501ES we hear a slight dulling of highs, slight compression of dynamic transients, and a slight reduction of bass impact – very slight to be sure, but still very acceptable musically.) The loss is enough to tell any expert that they are dealing with a copy, not the original source material – enough to keep commercial pirates at bay.

The recording industry is not satisfied. They don’t want you to own a DAT that can record at all! Thus, legislation has been introduced to require all Digital Tape Recorders sold in the U.S.A. to include a CBS designed anti-copy chip that prevents the machine from recording any **analog source material if it reads an anti-copy message imbedded in that material**. What is the anti-copy message? Simple – it is a CBS designed “bite” removed from the music – a 80 Hz wide notch at 3.9 kHz removed – upper A on the piano and everything near it. If your DAT notices that there isn’t any 3.9 kHz information on your source material, it won’t record.

This is not a digital message like the “don’t record me” data built into the lead information on a CD readable by the DAT but not affecting the music! This is a nasty chunk

ripped out of the music – hacked out by Freddy and Jason leaving great ugly bleeding wounds. This is CBS destroying your music, whether you record or not. The notch filter use is not limited to CDs. All source music can be filtered. It can be used at your FM station, on records and even eight-track tapes, and for convenience, could be used right after (or built into) the microphones when the original performance is done. Of course, the damage is more than just the removal of musical information – **steep filters ring!** Thus two large bursts of underdamped oscillations are also introduced into your music above and below the frequency of the notch. You are not going to like the results.

All is not lost. There are lots of good people fighting to protect the fidelity of the music. The editors of *Audio* recently testified before the Congressional committee considering the issue and proved by demonstration that, contrary to CBS recording divisions claims that the notch filters effects were inaudible, that they could hear the difference under blind test conditions. Would you believe that CBS’s recording division is trying to get the CBS’s publications division to fire the editors of the CBS owned *Audio*?

The **Home Recording Rights Coalition** is an organization of consumers, retailers, and manufacturers formed to fight the proposed legislation. Their address is P.O. Box 33576, 1145 19th Street N.W., Washington D.C. 20033. Their telephone number is 800 282-TAPE. Write or call them for detailed data on the struggle and to offer your support.

At the present time, the testimony of concerned experts like Len Feldman has held off the recording industry, and some congressmen who had misunderstood the issue (they thought the technology would prohibit direct digital copies, not all copies, and without musical damage) have changed their minds. The issue has been referred to the National Bureau of Standards to advise Congress if the CBS notch filter is audible.

The battle is not won yet though. **Write to your congressmen.** Tell them to **oppose H.R. 1364 and S. 506, the Digital Audio recorder Copy-Code Act of 1987** (introduced by Senator Gore and Congressman Waxman). Write them now, or live with damaged source material from now on.

I promised you a report on the Consumer Electronics Show held in Chicago the weekend of May 30th. I attended, along with Dave Umeda, and, for the first time, my daughter Vanessa. Vanessa, who is a 19 year old college sophomore (math major) has written her own C.E.S. report for you to give you a look through

a fresh set of eyes from someone who was seeing this circus for the first time. Her overview follows my observations.

In general, the major commercial innovations being shown were the DAT, CD-V, and higher resolution video tape recorders (Super VHS and ED Beta). The “in” thing seemed to be boom boxes of all sizes and shapes stuffed full of blinking LEDs that turn on and off in strange patterns in time with the beat of the music – a more effective form of aesthetic pollution than ever before. One radio even had a set of ruby red lips that moved with the beat – simply disgusting! Another common piece of junk was the indoor TV antenna shaped like a miniature satellite dish – receiving nothing but really impressing the nerds. People actually buy that stuff!

DAT prototypes were shown by many of the major Japanese audio companies and the sound was impressive (usually through headphones). Onkyo probably had the best sound at McCormick Place with an enclosed sound-proof booth holding their DAT, their highest end audio amplifiers, and huge Infinity speakers. They didn’t try to play too loud (a fatal mistake almost everyone makes at shows) and displayed excellent definition and musicality. DAT car radios were displayed too, and yes, they are small enough to fit in the dash replacing a mundane car cassette radio. Prices and release dates were not given, pending the uncertainty of pending “anti-DAT” legislation. However, the equipment is on sale in Japan, is starting to be reviewed in the U.S. press, and is available here “grey market” already (at a just \$1500 to \$2000 – wait a while!).

Among the clever things a DAT will do is to assign track numbers to each item on the tape making it very quick and easy to go find the work of music (or movement of that work) at playback. To enhance quick search speed, the tape wraps only half way around the internal drum (less wrap than with bigger video recorders use). This allows faster search movement of the tape allowing you to find anything within 15 seconds or so. The mechanism is **tiny!** It is hard to believe all the parts of a video recorder assembly shrunk down smaller than an audio cassette size. One concern I have is how long that mechanism will last, and how well will it be aligned in mass production. I wonder if the quality of production units will be as good as early prototypes and start up runs. Certainly, it is nothing I want to see to attempt to make a mechanical repair on – perhaps there will be new life for the Swiss watchmakers put out of business by electronic watch “movements.” Of course, like a video cassette, there is only “one side” with record and play time up to two hours now (with metal particle tape). DAT tape cassettes themselves were shown by many

of the major suppliers, and I even saw a few commercial pre-recorded tapes (several GRP labels come to mind).

Higher resolution video looks interesting. Many VHS suppliers showed upward compatible Super VHS machines (they will playback standard VHS tapes, but Super VHS tapes will not playback on standard machines). Super VHS improves horizontal resolution from about 220 lines to about 300 lines and gives playback quality nearly as nice as Super Beta has been for the past two years. How good the record quality is, I don't know yet. My personal experience with VHS compared to Super Beta is that while VHS is O.K. for pre-recorded movie playback, its recording quality is about like a third generation 3X Beta dub – yetch! ED (Extended Definition) Beta was something else – a complete 525 line capability and playback quality that looked more like 16 mm cinema than like video – simply stunning! Unfortunately, the market has decided that video quality is not important, it does not matter how crappy the picture and sound is, just as long it will record for 8 hours and lots of pre-recorded movies are available. Thus, you probably won't ever see ED Beta – just boring and inferior old VHS because that is what the market wants.

CD-V (Compact Disc - Video) is a marketing “hula-hoop” to try and suck all the teenyboppers and valley yuppies addicted to MTV video clips into the world of Digital Audio. It could also be considered a ploy to resurrect Laservision. It uses the CD sized disc to hold 5 minutes of video and/or 20 minutes of digital audio – just enough to stay within the normal attention span of the typical Neanderthal. The discs are gold in color to help distinguish them from normal CDs. Philips, through their North American Philips - Magnavox division, displayed a “really wonderful” new player with a slide out drawer that plays four different kinds of data discs (5" CD, 5" CD-V, 8" Laservision, and 12" Laservision) at platter speeds from 300 rpm to 1800 rpm depending upon what is needed for the format detected. Our “yield” of basic CD players passing our incoming inspection is about 70%. I can hardly wait to see what the yield is for a transport system about ten times as complex – it might approach 0% with any luck at all. A bunch of manufacturers have grouped together to push CD-V and there was a whole section of the showfloor dedicated to showing hundreds of already stockpiled CD-V discs (at about \$7-9 per shot) and playback machines from several sources. If you like MTV television, you will love CD-V – bleah!

Magnavox did not show any new CD players at all. The 460, 560, 650, and the newer 465 (a lower priced stripped version of the 650) were all that were displayed. We know there are three new models coming eventually, the 471, 472, and 473. The 471 is a stripped version of

the 460 (no index search capability or digital output port). The 472 is a faceplate restyling of the 560, but with the digital output port eliminated, and the 473 is essentially a restyled 650. Since the main features on next years models seems to be to eliminate useful functions, we are not anxious to see their appearance. We will continue to supply the 460 - 560 machines as long as they remain available (probably through next fall and winter). There are no electronic improvements – just minor faceplate restyling jobs. No, the 465 does not “replace” the 460 as some dealers have been telling you. The 460 is in short supply (we have excellent access to the identical 1460) so some dealers have been telling customers “stories” in order to make the sale with what they have available. We cannot install the Transcendence circuits in the 465 (no space for our board sets) and are dubious of “features” that don't make it sound better but simply make it more complex and thus less reliable.

I went to the show looking for a **turntable** replacement for the now discontinued Harman-Kardon series we had such good success with. I didn't see too much that was useful. One possibility is the **Ariston Q Deck**. It appeared to be simple, stable, and inexpensive. I have a sample on order. If they fill my order I will report on it. Do not assume we consider it to be good value until you hear further herein. **Thorens** showed some new turntables with simpler tone arm designs that might have a chance too. There was a resurrection of the **Rega** that also was interesting.

B&W showed several new speaker models but did not have good show sound this year. The problem was they displayed with their own B&W amps and preamp which have been a flop in the North American market (very harsh and bright sounding and way overpriced). **We never make final sonic judgements at the show because the conditions are too alien.** Several of the new B&W models are very interesting and we have them on order (will first see samples in August). The CM1 is the tiny two way matrix system mentioned last month. When mated with its column woofer, the whole CM2 Series 90 system was pretty impressive. It will have a retail price of \$1650/pair. John Bowers claimed the design goal was to equal the original 801 at half the price. While I don't think it is that good, it appears to be a heavy contender for being as good as anything in that price range – while demanding nothing of your room and space. **I saw nothing better at the show.** B&W also showed a DM1600 and DM1800 (fancy and expensive versions of the DM110i and DM220i that will need work before they can be released - ugly, ugly, ugly) and an uprated 801 claiming wider range and improved sensitivity, but with, un-

fortunately, a much uprated pricetag (\$4500/pair!!!). They make the 808s (unchanged) a better value than ever.

The overall state of the art of “high end” audio is pretty dismal right now. It was absolutely unbelievable how bad the sound was coming from nearly all esoteric audio hotel suite listening rooms. We heard bad sound ranging from harsh-bright to muddy compressed even from people who we know can give you good sound, such as Audio Research. Essentially, I heard nothing that I could not easily better with a CA-50 control amplifier and a pair of DM110i speakers in a decent acoustic environment. I will admit that a major part of the problem was the awful acoustics of the hotel rooms, but the exhibitors should have known better. Those displays that did not drive one away instantly with hard and strident highs were compressed and non-dynamic. Nothing we heard rated better than ho-hum and most would kill a chicken at 60 paces. Many were using California Audio Labs vacuum tube CD players which sounded like old vacuum tube power amplifiers (there were other brands of vacuum tube CD players that were worse yet) – and I am not so sure about the long term reliability of red hot vacuum tubes next to heat sensitive digital logic circuits. We did meet one clever young man, a Mr. Sims, at the Audioquest exhibit. He is working on a new Philips CD transport suspension we will soon be trying out, and he also gave me samples of Audioquest CD stabilizer rings which I will try out after vacation too [1990 note - don't use them], and report to you about. Now, I will let you have Vanessa's views on the show:

“In spite (or perhaps, because) of the fact that the CES show was the weekend before my college finals began, I attended my first show this year. Initial reaction: BLEAH! K-Mart would have to run continual blue light specials for three years to clear out all of the trash.

“I finally heard for myself the equipment from Audio Research, Conrad-Johnson, Krell, and the other esoteric producers that customers often compare our components to. I simply don't see how anyone can spend long hours agonizing about the difference between AVA's equipment and that of these other high end manufacturers; the equipment I heard at the show at best was pleasant sounding but had no dynamics, detail, or clarity, and at worst just made me wish I could listen to my roommate playing Madonna on her Toshiba boombox. The price tags on the equipment shocked me, too. \$20,000 for a tube amp?! I think I'll just pay for my last two years of college, or maybe buy an Audi instead. I didn't see anything at the show, at any cost, that came close to the performance of my college stereo - Fet Three Plus preamp, Mos-Fet 400C amp, B&W Matrix 1 speakers, Transcendence CD player, and

PCM tapes for a Sony Betamax, and that's with the speakers imaging into my bed (thanks to my roommate rearranging me into a corner).

"I gave up trying to hear music at the main floor of the McCormick Place and just took in the garishness. Outside of a few interesting DAT players and opportunities to get CDs cheap, there was little to interrupt the vast expanses of molded plastic. Boomboxes with blinking lights and fuzzy projection televisions don't impress me. The van FULL of speakers and car amps did impress me - I got out of range before they had a chance to turn it on. There were some clever gadgets though, such as an electronic log with a printer for recording car mileage that is useful if you need to keep records for business or tax purposes.

"One of the most enjoyable aspects of the show was the opportunity to meet several major figures in the audio industry such as Tom Jung of DMP, David Hafler, John Bowers of B&W, and Matthew Polk. I also finally met Gregg McArthur, our rep in Chicago, and want to thank him and his family for their hospitality. I guess, my best advice for someone going to the show is: **NEVER, EVER sit in the back seat of a car system display** because, sure enough, you'll be trapped in the car with someone turning the volume way, way up past the brain damage threshold."

Note that Vanessa is working for me again this summer, putting her math and physics background to good use building your equipment. Often, you will get Vanessa when you call here. No, she isn't the receptionist. Yes, she definitely can answer your questions!

Now for the long awaited **headphone junction box project**. For starters, you will need the following parts from your friendly Radio Shack store:

One #270-252 4" x 2 3/8" x 6" Metal Cabinet \$3.99

One #275-663 DPDT Mini Toggle Switch \$2.89

Two #274-312 3-Conductor 1/4" open circuit jack 2/\$1.79

Four #274-662 Nylon Binding Post Sets (red-black pairs) 2/\$1.39

Two #271-152 100 ohm 1 watt metal-oxide resistors 2/\$0.29

Next, refer to the sketch (compliments of Vanessa). The eight binding posts are mounted on one end of the chassis, black on the bottom row, with the two rows 3/4" apart on centers (spacing of standard dual banana plugs). The two phone jacks and the DPDT switch are mounted on the other end (after appropriate hole drilling). The orientation of the switch will remind you of the setting when you are

finished. With the lever down towards the phone jacks, phones will be switched on and speakers turned off. With the level up away from the jacks, the phone jacks will be off and the speakers turned on.

Wire up the connections per the sketch with standard insulated hookup wire taking care that no bare wire can touch the chassis. Note that the headphone jack ground lugs are connected to only the right channel amplifier ground posts. This is to prevent accidental amplifier damage if the speaker wires are later inadvertently reversed. Both channels of the headphones are still grounded at the common ground amplifier (don't use the box with bridged or floating ground power amplifiers).

The 100 ohm resistor values may not be proper for your headphones depending upon their sensitivity. If you find they get too loud too fast, substitute 300 ohm or 750 ohm resistors to cut the gain back. If you cannot find the substitute resistors locally, we will supply them free of charge if, and only if, you send us a stamped, self addressed padded envelope (two stamps) and request them in writing.

Now your power amplifier connects to the headphone box IN jacks and your loudspeakers connect to the headphone box OUT banana jacks. The switch connects either the speakers or the headphones (through a dropping resistor) and you can use two sets of phones at once. Have fun with this friendly little project and get better headphone performance too. Next month don't look for *Audio Basics* until early August - we will be messing around in Alaska in July.

Frank Van Alstine

VOLUME SIX NUMBER SEVEN JULY, 1987

Well, here we are again, a couple of weeks late after over eight thousand miles up the road to Alaska and back. You can add in another thousand miles up and down over Alaskan frost heaves and Yukon Territory potholes and mud. It was an interesting experience, beautiful and educational, but not a drive I would care to make again.

You need to know just a little about Alaska. The whole place is infested with glaciers and moose. They have ice fields up there that could cover many eastern states completely. We saw grizzly bears and even timber wolves stalking caribou. The whole place is right out of an old *Boy's Life* adventure magazine. There is no agriculture base at all - no economy to support small towns or villages - so there are unusually few (aside from remote Native American villages) small towns. There is Anchorage - a large coastal city from where much of the necessary goods for the state are distributed.

There is Fairbanks, kind of a remote frontier town - reminds me of a North Platte, Nebraska of the 1950s, there are a few coastal villages, most served only by sea and air, and there are a few remote road junctions. Possibly the critics of the original purchase, who called it Steward's Folly and Steward's Icebox, were right. Aside from the one time shot in the arm from the oil boom of the 1970's there is not much going on to support the economy. It is beautiful, it is vast, it is alien - it simply doesn't get dark for most of the summer and that really seems like a part of a different world. It is **expensive!** Bacon and eggs for breakfast will cost \$7.95 and a very cramped version of a Super 8 motel room will be over \$100.00.

It is inhabited by really nice people. Almost all traveler's services - home made meals, gas stations that still clean windows and check oil, information services, and local entertainment, came with sincere friendly efforts to please and care. It may be the last refuge for those escaping from sullen east coast service experiences. I have lots of Alaskan audio clients. I suspect a good music system gets pretty important during the winter, when as a payback for those long summer days, it simply doesn't get fully light at all. I am glad we have an Alaska - we need it. We need the optimism of still having a frontier - a place where people are not packed wall to wall - a place that tells us that human beings have not done it all yet - that we still have a ways to go to adapt to our world.

You may have read recently that **Toshiba**, along with a Norwegian machine tool company, not being satisfied with its video, audio, business machine, and semi-conductor profits in the U.S.A. decided a better investment could be made by **selling U.S. defense secrets to Russia!** For years, the U.S. has been able to get by with a rather small submarine force because Russian submarine propulsion technology is so crude they make enough noise to be easy to track. Thanks to our good friends at Toshiba, not any more. In complete violation of even Japanese laws, Toshiba secretly sold very sophisticated computer controlled milling machines to Russia - and the technology to machine super-quiet submarine propellers. Now we cannot track Russian subs reliably - they are much much quieter thanks to their friends at Toshiba. **The U.S. Senate has voted 95 to 5 to boot Toshiba's ass out of the U.S.A.** I absolutely support this action - let them sell boom boxes in Siberia. But, I suggest we don't wait for the U.S. House and the President to act. **BOYCOTT TOSHIBA NOW! DO NOT PURCHASE ANY TOSHIBA PRODUCT, AND INFORM ANY TOSHIBA RETAILER TO DROP THE LINE OR LOOSE ALL YOUR BUSINESS.** Toshiba is going to

cost you about **100 billion tax** dollars because our submarine force must now be heavily reinforced. Newspaper apologies are not good enough – lets see if Toshiba starts buying us submarines. If not, get rid of them!

I have got a lot of new, useful, and interesting products to talk about this month. We have received several samples of new things we saw at the C.E.S. show that are working out really well, and we have got some improved and new Audio by Van Alstine products to explain to you too.

First of all, how about a new turntable (with arm) that is quiet, stable, musical, available, and rationally priced? We have got it – the new **Thorens TD 280**. This is a much simpler (and less expensive) unit than the Thorens turntables you may know of – and we think a better unit too. Thorens has always made a line of heavy, sub-frame sprung belt drive turntables with complex tone arms. We have always felt they were “O.K.” but the overly complex arms had a bit of a high frequency “edge” and the suspensions were fussy – especially in keeping belts in place during start-up.

The Thorens TD 280 is a whole new animal.

The tone arm is a much simpler design, with less opportunity to resonate. We can access the horizontal pivot bearings and the bottom vertical bearing to smooth things out even more with liquid silicon. The suspension uses damped sprung feet instead of the much more expensive sprung sub-frame method – a simple suspension that we find works very well in a large variety of applications. The chassis itself is dense particle board – not plastic – and seems to be quite inert. It has the typical full size cast two piece Thorens platter with a simple smooth bearing and belt drive. The motor is a **low voltage** 24 pole synchronous motor driven from an electronic oscillator. Thus, 33 and 45 speeds are selected by simply changing the oscillator and motor speed – no fussy mechanical linkages needed. Better yet, the low voltage motor is very, very quiet and has essentially no external hum field – **Grado cartridges work just fine with no hum at all**. Thorens makes the conversion to low voltage in a small transformer module right at the AC outlet, so, like our late T-30 package, there is no line level AC entering the turntable chassis to shake things up.

The unit, made in West Germany, has damped cueing and a velocity sensing auto-lift that picks up the tone arm and stops the platter at the end of the record. The lift sensor is optical so arm friction is not increased. The whole mechanical package makes a lot of sense.

It sounds (or more accurately – doesn't sound) just fine. It is quiet, stable, and smooth, with clear and powerful bass (no boom) and smooth and defined highs without mechanical nasty

edges on the sound. It is easy to use and set up and has an attractive black vinyl finish. We think it is as good a long term turntable value as you are going to find. Our price is \$350.00 complete (turntable, arm, hinged dust cover, latest Longhorn Grado installed, and shipping to you in the continental U.S.A., and with our bearing lube refinements too). If you want it without cartridge, you should find it for about \$250.00 in your locality. It is a real winner.

We have now had the **Magnavox CDB465 CD Player** in the shop and have determined that we **can build all our circuit improvements, The Fet Three, The Fet Three Plus, and The Transcendence circuits** into this CD Player. The CDB465 is a lower priced and simpler version of the CDB650, with favorite track programing (the ability to program the player to remember what tracks on a whole bunch – about 40-50 – of your CDs you want played). The favorite track programing logic and memory is built on a more complex front panel PC board and does not use up any additional main chassis space. Thus, there is still room for our five PC card Transcendence circuit set (that simply won't fit into a CDB650).

It is not a better sounding or better playing machine than the standard 460 and 560 models we use in routine production. It is a bit more expensive, and a bit more complex, so we don't plan on stocking it at this time. But, we can rebuild your unit if you send it to us and it is in perfect working order. The musical results will be just fine.

Once in a long time a loudspeaker system comes along that is a truly extraordinary performance value – a system that easily sets new standards. We have been a B&W dealer long term (although we don't like all their products) because over the years, B&W has set new standards time after time with products such as the 801s, the 808s, the 110s, the DM12s, even the original DM6s. Well folks, they have just done it again. We have got our first production samples in of the new **Concept 90** series B&W loudspeakers – the CM-1 Mini-Matrix and its matching Mini-Matrix Tower Woofer which when combined yields the absolutely awesome CM-2 three way system. This is a system with such refined definition, musicality, space, and air that you probably won't believe it even after you hear it. It is what Apogees are trying (unsuccessfully) to do, but without bizarre demands on your room, amplifier, or pocket-book.

The CM-1 is a tiny two way system. It is 9 5/8" high, 6 3/8" wide, and 8 5/16" deep, weighs 11 pounds, and comes with attractive little stands to lift it clear of large flat surfaces. The tweeter is a new 26 mm metal dome, the woofer is a 126 mm Kevlar cone. It has electronic overload protection. The cabinet is a

Matrix design, made of molded glass fibre filled polyester, with white, black, or matt grey finishes. The sound is – oh my – wonderful! It plays big, open, wide range, and reaches way into the inner details of the music. Its balance is superb – none of the “small” or high pitched sound of other small cabinet loudspeakers. Colorations are absent – it is absolutely neutral. Although this is a much smaller system than the very highly regarded DM12, it plays much bigger and better. It is an 8 ohm system with 85 dB sensitivity and -6 dB points at 65 Hz and 40 kHz. No, it won't shake the floor on organ pedals or break the windows with digital dynamics, but it does have much more natural dynamics and bass tone quality than I thought possible in a speaker this small. It is a real full range system, not a toy for your den. Our price for a **pair of CM1s** including shipping in the continental U.S.A. is \$550.00. You will need 50 watts of clean power per channel to get the most out of them.

After you get over the shock of hearing all that musically faithful sound from the CM-1s, be prepared to hold onto your chair again when you add the Woofer Towers to build a set of CM-2 Mini-Matrix Towers. Now you have a floor standing three way, four driver system that will just blow away (from a sense of definition, space, imaging, and trueness to the spirit of the music) any competition at twice the price. People ask me why I don't handle Snells, Apogees, Vandersteens, JSEs, etc. It is because I never thought their all-around performance was satisfying enough. There was always some weakness or coloration I couldn't live with. I always felt that speakers like the DM330 were just as good at a much lower price. Now the CM-2 Towers simply bury these other speakers, including the B&W Matrix 2 and 3 models too.

The CM-2 complete system stands 39 3/16" high, 8 5/16" deep, and **only 6 3/8" wide**. It weighs 35.2 pounds each. The woofer columns contain two 130 mm bass units, the input terminals, and the passive crossover (150 Hz) to the CM1s. The components bolt together into a very trim and attractive tower. Power handling is 200 watts, with electronic overload protection for the CM-1 sections. Sensitivity is 85 dB, max output is 107 dB, and the impedance is 4 ohms. Use a high quality 70 watts and up on these beauties. They play bass with authority and great tone structure. They don't (at this size and price) have the dynamic impact or brute force “punch” of the bigger (and more expensive) B&W 800 series speakers. They do have -6 dB points of 33 Hz and 40 kHz.

Our price is \$1400 a pair complete (two CM-1s, two Woofer towers) including shipping to you in the continental U.S.A. Your finish choice is matt grey, black, or white. The woofers

alone are not available separately at this time. Walnut and rosewood finishes for the woofers will be available later at extra cost.

Now for an evaluation of five sets of new **Sennheiser headphones**. Sennheiser broke into the U.S. market several years ago with their lightweight HD-414 phones at the time when all others were like wearing two teacups in a vise. The HD-414s were very good for their day – with one weakness – cord sets that tended to fatigue and break easily. With all the new models, that old problem is long gone. Sennheiser now has several steel strands in the cords for strength and although the cords remain very flexible, I think you could now haul boxcars without breaking them.

Unfortunately, the U.S. dollar does not buy as many German marks as it used to, so the prices of the Sennheiser phones have climbed a lot – not really price competitive with many Japanese headphones. The construction quality is very nice though. The five models evaluated range in price from \$49.00 to \$179.00 a set **and our evaluations showed there was no correlation between price, musical quality, and comfort**.

Two new testers are at work here – my kids. Since they use headphones much of the time, both Frank (age 17) and Vanessa (age 19) were given the whole mess to evaluate. They were to compare the phones to each other and to the Sony MDR-S30 headphones they normally use, and give me a thorough written report. Each worked separately so the results are independent findings – with interesting consistency. The final results indicate that there are some Sennheiser models you should consider if buying headphones.

The five Sennheiser models are as follows (listed lowest to highest price).

HD-40-2 lightweight standard size “open-aire” phones. \$49.00

PD 100 lightweight miniphones. \$58.00

HD-414SL Improved version of original HD-414. \$89.00

HD-420SL New open-aire design with samarium cobalt magnets. \$99.00

HD-540 “Reference quality” top of the line new open-aire design. \$179.00

Frank rated the HD-414SLs best noting that they had good sound, no harshness, and a full spectrum. He liked the lightweight comfort, felt they were easy to adjust, and the cord did not get in the way. He had no negative comments about them.

He rated the HD-420s in second place – liking the sound but not as happy with the cord set.

His old Sony MDR-S30s ranked third even though they hurt his ears when he used them with his reading glasses on.

The PD 100s came in fourth in Frank’s rating. He thought the cord set was too short, and that they were too small for really good sound.

In fifth place came the lowest price HD-40s. These were peaky sounding making background noise sound harsh, and he felt they were difficult to adjust.

Firmly in last place came the most expensive HD-540s. He felt they were harsh sounding, sensitive to noise, clumsy to wear, and he did not like the feel or look of them. High priced did not mean good quality or ease of use.

Vanessa rated the HD-420s best. She felt they were comfortable and stayed in place well. Compared to her Matrix One speakers, she felt the HD-420 had decent clarity, O.K. dynamics, and a natural balance. They had a reasonable, but not deep, bass response. They did not emphasize hiss.

She rated the HD-414SLs a close second, but did not like the fit or the bass as much.

Vanessa’s original Sony phones came in third with her too – definitely lower in quality than the two best Sennheisers.

She placed the PD-100s next, noting a good fit and comfort, but that detail and deep bass had gone away, along with a lot of the dynamics. In their favor, they did not emphasize circuit or source noise.

In Vanessa’s ratings the lowest price HD-40s came in fifth too. She noted a harsh high end that did emphasize hiss and a lack of dynamic range. She did not like the foam earpieces resting against her ears. She also commented “no bass – the beginning of ‘2001’ comes out as a hum.”

In last place languishes the most expensive HD-540s! They were the most aggravating in emphasizing background hiss. They didn’t seem to image well. They were bright and zippy. They tended to fall off if you tipped your head back – an uncertain fit. The bass went away. No, you don’t always get what you pay for.

Each kid got “paid” for their work – their choice of the phones they liked best. Thus, both the top rated HD-420s and HD-414SLs are now in long term service here while the factory rep got the rest back. Their old Sony’s are now relegated to tuner testing duties.

No, I am not going to stock or sell Sennheiser phones, I think their list price is too high to make them really good value (they were three times as expensive as the Sony phones and maybe only 50% better musically). However, many products are widely discounted and both

the HD-414SL and HD-420 Sennheiser headphones are good, comfortable, and durable items. If you are looking for new headphones, price them in your local market, you can sure do a lot worse.

Now it is time to talk about some new Audio by Van Alstine products that we know will interest many of you. We have been busy with new and upgraded designs all this year and really have not told you much about them.

First of all, I have just completed a significantly upgraded **power supply for the Super Pas & Super Pas Two preamplifiers**. This new Supply board has a 44,000 μ F heater supply (cuts ripple in half again) and six separate B+ supply sections so that each section of each channel has its own isolated supply, simply eliminating channel to channel and section to section interaction. It makes the preamp much quieter, amazingly clear, gives a significant bass and dynamic range extension, and focuses imaging and depth very nicely. The improvements are large and very noticeable on both the line and phono sections on all sources. Because it is built with all new low leakage Panasonic high voltage (not photoflash) capacitors, it comes up to working voltage much quicker – warm-up time is only a minute or two.

The new power supply is already in production on all new Super Pas Two orders built here (at a \$50.00 increase in price). **I will be writing do-it-yourself-kit instructions** later in August. The new power supply **will interface with all older Super Pas units, and any stock PAS preamp too**. The do it yourself kit will be \$100.00 including parts and our PC board, or will be available as a \$150.00 retrofit if you want to send us your preamp for our installation of the new supply.

With the new power supply, the Super Pas Two comes close to the frequency range and dynamic impact of our solid state units, while retaining its overall natural character. While I can’t say that now I like it better than our best solid state efforts, I certainly do like it much better than I did, and can really assure vacuum tube lovers that they won’t be giving up anything important any more. If you like tubes, you will really love the extended and stabilized Super Pas Two, and I suspect it will really impress the critics too.

We now have an improved, higher power version of the Dyna St-150 chassis Mos-Fet 150C power amplifier available at no increase in price (it is still \$500 for a complete new unit). Because Stereo Cost Cutters ran out of original power transformers, they are giving us a much better price on new St-150 chassis. Since we had to have a new transformer supplied for our own application, we specified a more expensive power torroid with higher current and

much better regulation. Thus we now make **75 watts/channel instead of 50 watts/channel** with brand new Mos-Fet 150C amps we supply in the Dyna chassis. Rebuilds are still 50 watts per channel unless you want to pay extra for the new transformer. The new torroid is also very quiet with low external hum fields. Thus the upgraded Mos-Fet 150C is extraordinarily quiet too. Because Hafler is raising the price of the DH-120 chassis, you may want to look more closely at the Dyna St-150 chassis for your Mos-Fet 150C amplifier because it will save you money if low sleek styling is not that important to you.

Our new **Phase Inverter Circuits** are working out really well. This is a \$100.00 option on nearly all our solid state preamplifiers. It provides a second set of isolated audio outputs 180° out of phase with the normal audio outputs. They have several useful applications. First of all, they allow the **direct mono bridging of two common ground stereo amplifiers for triple power application**. No changes are required to the amplifiers and no other accessories are needed. Because our phase inverter circuits (Fet Three Plus technology) are so fast they cause no crossover distortion. The outputs are buffered LH0002CN devices that drive amplifier loads great too. The isolated outputs can also be used to drive a second stereo amplifier for remote or headphone use without interaction with the main amplifier, or to drive accessory equipment without loading down or interacting with the main system. The stereo phase inverter circuit board can be built into your preamp when it is here for our circuit sets, or as a later retrofit. Call us for more details about it.

I have engineered a bunch of improvements in our Dyna SCA-50 chassis based integrated power amplifiers. First of all, we are installing much nicer black and red five way binding post speaker terminals built on a RG4 epoxy PC board. These accept bare wires or (recommended) banana plugs. They are much sturdier and nicer to use than the original Dyna thumbscrews, and are done at no extra cost to you. We have just upgraded the design of the power amp circuits, to provide much better power supply decoupling and output decoupling – you get a quieter and more dynamic amplifier at no extra charge. As an extra cost option, you can now order the CA-50 with Fet Three Plus preamplifier circuits (both phono and line-tone control) for a further improvement in dynamic range, definition, and purity. And we will soon have another extra cost option available, a higher current and voltage torroid power transformer to up the rated power by at least 50%. We realize that there are lots of you that want state of the art **sound quality** but within a college student kind of budget. Thus, we keep going back to our integrated amplifier

designs to provide the best sonic quality we can do at affordable prices. Combine a CA-50 with a reasonably efficient loudspeaker (such as the B&W 100i series) and you will have high resolution sound without high resolution prices.

If you are looking for a real budget value in a basic power amplifier, I have a few complete new Mos-Fet 120C amplifiers available (built in clean used Dyna St-120 chassis) at \$375.00, delivered in the continental U.S.A. This classic of ours was recently upgraded with a new power supply board and a new output network and audio power supply decoupling board for more power and much quieter and more dynamic performance. We find it makes a great replacement (much better sound and durability) for those of you still trying to keep aging St-70 or MKIII vacuum tube amplifiers running. Your tube preamp will drive it fine, and you will have better sound, much less heat, and easy interface with your system.

Frank Van Alstine

VOLUME SIX NUMBER EIGHT AUGUST, 1987

Hey there you guys – are you listening? I am getting a bit worried because the feedback I have received from you regarding the CBS “anti-copy” notch-filter that I wrote about in June is **absolutely zero - zilch - none!** The information seems to have dropped into a black hole.

To repeat the warning – the CBS notch filter scheme **affects all of you whether you buy a DAT or not!** ! The anti copy “bite” will be done at the original master tape level – ruining all consumer source applications – records, cassettes, compact discs, and pre-recorded DATs – even 8-tracks! **Thus your music gets diddled no matter what source vehicle you buy, and since the damage will be done at the master source level, you won't be able to repair the damage ever!**

You should be worried! You should be writing your congressman to get this legislation killed! You should be calling me to ask more questions about the issue if the consequence of this pending legislation is not clear to you.

I have not heard from a single subscriber! Don't you care about the fidelity of your future source material? If not, why are you reading this?

If you are reading this, I would like to tell you about a problem that can occur when you **hook up your VCR to your audio system when your program source is Cable TV.**

The problem that frequently occurs is **annoying hum** – hum that continues on all switch positions of the preamp as long as the VCR is connected into the system.

The source of the hum is an AC signal on the ground (shield) side of your Cable TV or on an apartment house distribution cable system. Because the cable signal is split, patched, amplified, and tapped so many times between its source and you, it is subject to picking up strange ground signals (from as little as running parallel with a power line for too long a distance). When you connect the cable to your VCR and then connect an audio cable from the VCR to your high fidelity system, you “import” that ground trash directly to the chassis of your preamp, the ground side of all its inputs and outputs, and on to your speakers.

To confirm that the cable is the problem, **disconnect the antenna cable from your VCR** and play back a pre-recorded video tape through the high fidelity system while the Cable TV antenna is completely isolated from your VCR and TV. The chances are very good the hum will now go away. If so, call your cable system and have them repair their problem that is causing your hum. [1990 Note: *You can probably eliminate the hum problem caused by strange ground signals on a cable system connection cable by installing a 75 ohm to 300 ohm matching transformer on the end of the cable and using the 300 ohm (screw terminal) antenna inputs rather than the direct 75 ohm terminal. The matching transformer will isolate the system from the cable ground.*]

Regarding the **banish Toshiba** situation – there seems to be a bunch of apologists out there who want us to be nice to Toshiba. They claim that the sales of military secrets to Russia was not really Toshiba's fault, that Toshiba has printed an apology in U.S. newspapers and magazines, and that the damages were done by a Toshiba subsidiary – not the main company itself – and that besides they have fired the officials responsible for the treason.

Sorry – **not good enough, Toshiba! You did not apologize nor start firing executives until you got caught!** You were happy with your Russian trade until then. Well, folks, help Toshiba do business with the Russians – **only! BOYCOTT TOSHIBA!**

Keeping your audio system working.

We spent a lot of time back in late 1982 trying to explain to you how to troubleshoot problems in your audio system, without much success. We were probably a bit too detailed and demanding and lost the majority of our readers before really saying everything we wanted to.

However, we do know that **you want your audio system (and other possessions) to work properly long term.** You also want to be able to get any problems fixed, properly, the first time. You want to get your money's worth.

You don't want to have to learn to be an electronics technician to use and maintain your equipment. That's what you pay us to be. You have other interests you specialize in – you want your audio system to be a trouble free “appliance” – there to give you pleasure, not a hassle.

However, sometimes you do get very frustrated, very fast, when the system doesn't do what you think it should do or want it to do. You are dealing with sophisticated technology that you have chosen because it is necessary to truly reproduce all the nuances of the music. If you were not as interested you would be using a simple “boom box” and not be an *Audio Basics* reader. Thus, you do have to take the time to gain an understanding about your equipment to get the most out of it and to most efficiently keep it working at its best.

So, I want to go through some suggestions regarding proper use and care of your equipment, and suggestions regarding servicing it so that you will get the most value from your system.

I would like to talk a bit about various component types and what cautions you should observe in using them, what the normal symptoms are if they have problems, and what you should check (and tell your service technician) if you think there is a problem.

Let's start with the **CD PLAYER** because that is the component that you have had the least long term experience with and are probably the least familiar with.

First of all – **make sure you keep your CDs, especially the bottom (play) side, absolutely clean.** Dirt or foreign matter on your CD can be transported to the hub mechanism inside the CD player and left there, causing load and play problems with all CDs. When your records or phono stylus got dirty, it was easy to take care of the problem. In a CD player even minor problems require the services of a trained technician. You must observe the surface of each CD before you play it and make sure it is spotlessly clean or pay a technician, far too often, to remove the dirt after it has been transported inside the machine.

Because the CD player contains a complex computer, and because computers produce very high frequency electronic pulses as they operate, and because these pulses can be “broadcast” through the air, and because it is nearly impossible to completely shield the CD player so that the broadcast extraneous garbage is completely contained, you should try and keep

your CD player isolated from your other components. In particular, the CD player, if placed too close, may interfere with the performance of FM tuners and TV sets.

Obviously, inasmuch as the laser in your CD player has a finite service life (about 2000 hours) and because of the interference it can cause, you should not leave it turned on all the time, but only when you are actually using it. Properly designed solid state equipment has a warm up time of only a few seconds and does not need to be on all the time to “sound good.”

Don't assume that just because your CD player fails, on a few random CDs, to load or play properly that it is defective. As I told you herein last year, there remain some incompatibility problems between certain out of tolerance CD moldings and the hub mechanisms in various CD player designs. Magnavox, for example, has changed hub designs three times since 1985 to accommodate a bigger selection of “bad” CDs (all changes unadvertised) and only the most recent hub design – used in all 460, 560 and recent 650 and 465 machines – really does a good job of making up for out of spec CD moldings.

Because they are highly complex and sophisticated mechanisms (only a few years ago all the necessary parts would have filled your house and cost millions of dollars) designed for low cost assembly line production to reach a mass market, a real percentage of CD players are going to have “infant mortality” problems – fail early in their service life. We go through an extensive culling and burn-in process with the CD players we sell to do our best to remove the problems before they get to our customers. If you buy from a discount warehouse, you won't get a pre-culled machine so you may need to use your return-exchange and warranty privileges, if necessary, to get a good sample. The main thing to remember when buying sophisticated but mass produced complex products is that the reason mass merchants have return, exchange, and warranty policies is to insure that you do have the opportunity to get a good working unit. Don't get mad or give up if your brand new “wonder” fails – take it back and exchange or repair it. It is simply part of the price you pay to get very low prices for very complex mechanisms.

A lot of people have been “tinkering” with their CD players to try and get better sound. Unless you know exactly what you are doing – **don't!** Stuffing more than one CD into the drawer at a time can permanently bend internal clamps, deform springs, and put excessive loads on the bearings and servo-mechanisms. Using damping putties on internal parts can cause mechanical interferences, load down suspension springs, and the fumes given off by compounds such as mortite or ductseal **are**

corrosive and can kill the electronics in your machine. Of course, do-it-yourself changes void your warranty.

CD players, like turntables, require special care to protect bearings and mechanical adjustments. Don't use the machine until it “thaws out” if it has just come in from winter cold. You can damage bearings if you force things before lubricants are at normal room temperature. CD players need special care in shipping too to avoid bearing damage and knocking lasers out of alignment. Save, and always use, the factory supplied travel screws and original packing. Also, CD players are susceptible to interference from other electronic appliances. One person told us his unit switches into fast forward when his cordless telephone rings!

All these cautions sound pretty bad. There is a bright side though. With CDs handled properly, you will have no wear, no noise, and no “popcorn eaters” near you in the audience. The machine, if solid, should last as long as a good turntable and be less expensive to replace (if you have purchased our “high end” circuits, they can be swapped down the road to another inexpensive chassis). We think a CD player is a rewarding thing to own right now, even if it does take a bit more care.

One further caution regarding **cleaning the CD discs themselves.** You are used to cleaning records with a rotary motion (with the grooves). With a CD, **don't do that!** The reason – any scratches you might make with the cleaning materials would then “take out” a long chunk of contiguous information, a bigger loss than the system can handle. At that point, the player will “gorp” and give up.

The preferred method is to clean the CD (cotton buds and distilled water work fine) with a **radial motion** (from the center to the edge). That way, any inadvertent scratches would be **across the data** and only take a little bit from any given timeframe. The player could then correct for that small missing chunk and the CD would still play. Again, the machine can make thousands of small corrections, but no big ones. Take care!

With the possible exception of loudspeakers, **the Power Amplifier** may be the most abused and mis-used component in the audio system. Certainly the power amplifier is the component that does the most work and manipulates the most energy, so, under overstress and fault conditions the amplifier can more quickly use the high energy available to thoroughly destroy itself.

Because it is more likely for “blow up” problems to occur with power amplifiers than other components, conscientious designers build in **protection circuits and devices** into power amplifiers to try and help them stay alive under

abuse and accident conditions. Unfortunately, “Catch 22” says that if the user is not aware of the function of all the “fail safe” guards built into his amplifier, he may mistake the proper operation of protection safeguards for a failure of the product, and needlessly return a working product for unnecessary repairs.

Also, because the power amplifier is a **really stupid device** (it doesn't know the intent of the input signal) it will do its very best to put out exactly what the input tells it to, even if the effort causes it to destroy itself. Thus, **you need to know what the amplifier cannot know** – namely, what kind of “bad” input signals and output loads to watch out for.

Let's start out with something really simple, but still capable of causing needless service worries, namely **the pilot light!** It is not uncommon for users to assume that their amplifier has failed when the only problem is a dead or flickering pilot light that really doesn't have to be fixed to keep the system playing music.

Basically, there are **three kinds of pilot lamps** and **only one kind** is an indication of circuit trouble. The three possible kinds of pilot lamps are: **incandescent bulb** (a miniature light bulb), **neon lamp**, and **LED**. There are advantages and disadvantages to the use of each and major differences in what a failure means. Let's explain:

Incandescent light bulbs are inexpensive, user replaceable (they plug in), and run from AC power (either directly from 120 volt AC power or – much more likely in an audio application – from a low voltage AC transformer tap). They require no significant extra circuit expense, they put out lots of light, and it's hard to get white light (useful for meter displays, etc.) any other way.

Unfortunately, miniature incandescent light bulbs **are not very reliable**. They are sensitive to mechanical vibrations (they like to fail right after a unit has been shipped cross-country) and they tend to last only a year or so at best. Also, there are hundreds of different types in all sorts of voltage ratings, shapes, and sizes, and only the one correct for the specific application will work for you. That is one very good reason for you to **save your instruction manuals**.

With rare exceptions, incandescent bulbs are after the main system fuse, but ahead of all significant circuits in your amplifier. Thus, if a bulb burns out (which it will occasionally) the amplifier will still work just fine. Of course, if a circuit defect or an external overstress causes the main fuse to blow, then the light bulb and the amplifier circuits won't turn on.

You, as a user, need only to make a simple test. If your incandescent pilot lamp doesn't turn on, but the amp still plays just fine, the only problem is a burned out bulb (check your manual for replacement information). If the amp doesn't play, then the problem is likely more than just the bulb. Read further for suggestions about what to do then.

The neon lamp is similar to an incandescent bulb in that it runs directly from AC needing at most an inexpensive dropping resistor in its circuit. It also connects to the circuit after the main fuse, but ahead of all serious electronics. It too is inexpensive to use.

It has several advantages over an incandescent bulb – namely it is smaller (so it can be and often is built directly inside power switches), it is much less sensitive to mechanical vibration damage, and it tends to last much longer.

It has some disadvantages – it is nearly always hard soldered into the circuit (not a plug in) and **it has a strange failure mode that tends to needlessly worry people**.

The failure mode is a **flicker** – sometimes even “in time” with the bass beat of the music if the system is being pushed hard. **Not to worry!** The flicker is only a sign of low AC line voltage or a defective bulb, not a defective amplifier.

A neon bulb works by applying a AC voltage potential across a bunch of compressed neon gas – ionizing the gas and making it glow. If the voltage is too low, or if there isn't enough gas, it won't glow. Neon is expensive. Bulb makers use only enough to make the bulb work. Thus, in summer low line voltage situations, it is quite possible that your neon lamps will be “lazy” and not turn on, turn on late – after a line voltage spike has finally come along to get things going, or to “flicker” if the voltage drops (as it does when you draw lots of power from the amplifier). As the neon bulb ages, neon tends to “leak” out through the glass so flicker becomes more likely.

Again, make a simple test. If the amplifier plays music just fine in spite of a dead or flickering neon lamp then only the bulb is at fault (have a service shop repair it at your convenience). Obviously, if the amp won't play music either, then you will have to investigate further.

A LED pilot light is a DC device and its failure usually means that something more is wrong!

The advantage of a LED (Light Emitting Diode) is that it is very small and very reliable with a long service life – in general it should last the life of the amplifier. The disadvantage is that it runs from DC, and thus cannot be used directly across the AC power or a low voltage AC tap. It must be connected, through proper current limiting resistors, to your power supply after the AC current has been rectified and converted to DC – a connection **much later in the circuit**.

Thus, if a LED indicator doesn't light, this usually means that the DC power supply to it has been interrupted. This means that the main fuse has blown, or that the power supply of the amplifier is defective. It is rare that you will find a “dead” LED pilot lamp and a working amplifier at the same time. A dead LED nearly always means you have other problems.

There is one “strange mode” regarding LED pilot lamps you need to know about – namely delayed turn off or continuous operation (at very low level) even when you have turned the unit off. Because the LED is connected after your DC power supply, if your amp has a very big power supply then the LED will only go out when the power supply discharges – often several seconds after you turn the unit off. Also, depending upon how internal power line filtering is done inside your amplifier, there may be enough very low level AC “leakage” across the filters to keep the LED faintly glowing, even if the amp circuits are off. This is not a problem to worry about.

Maybe you think I have talked too much about pilot lamps (the discussion applies to all your components, not just power amplifiers) but if you could see how many units come here for unnecessary service because users have decided that a burned out lamp meant the unit was “dead” – if you could hear how many times we have had to tell people that a flickering neon didn't mean that their amp was getting ready to blow up – then you would understand that the discussion above is, if you read it, intended to save you money and unnecessary system “down time.”

I want to get into that most simple and effective amplifier protection device next, **the fuse**. However, I have already run out of space to even get a good start this month but I do want to leave you with a few thoughts regarding fuses.

We see many unnecessary service requests just because the user doesn't know that **there is more than one type of fuse**. If you use the wrong fuse type (even of the right current rating) for a given application, you are going to have unnecessary problems. Either the fuse

will blow much too easily, making you think that there are serious problems, or, the fuse won't blow quickly enough (if at all) causing serious problems.

As a generalization, there are **three types of fuses** – quick blow instrumentation fuses, standard blow fuses, and slow-blow fuses.

Quick blow instrumentation fuses are used in much test equipment and instruments where an overload cannot be tolerated at all. The fuse is designed to blow very fast even if a small overload occurs for a very short “blink of the eye” time. In general, instrumentation fuses are not found in audio amplifiers.

Standard blow fuses are designed to tolerate a small overload for a short period of time (real fractions of a second). In an audio product, short transients may exceed desired steady state levels quite often. We want to protect things, but not blow fuses on every drum beat. Thus standard fuse time constants are specified to protect output circuits and speakers.

Slow-blow fuses are designed to take a substantial overload for a longer (second or two) time. They are used in applications ahead of and protecting transformers and power supplies. When you turn on the amplifier the discharged power supply capacitors look like a dead short at first. For about a second, until they are charged up, they demand current from your transformer far in excess of “steady state” operation. A standard blow fuse would fail in only a cycle or two with this overload. The slow-blow fuse is designed to accept a big overload for a short period of time without blowing, but, to quickly fail on even a small overload that is sustained.

Think about why slow-blow fuses are no good for protecting speakers – we will continue next month.

Frank Van Alstine

VOLUME SIX NUMBER NINE SEPTEMBER, 1987

There have been some changes made around here!

Surprise, a completely new *Audio Basics* layout prepared on a Macintosh SE computer (with hard disc) and an Apple Laserwriter printer! I have only been playing with this equipment for about a week (along with Microsoft Word 3.01 and MacPaint) and I don't think the results look too bad. As I learn more about the equipment and add a scanner and a digitizer to get good graphics into the system (I'm no artist) we will really give you some interesting results.

Wanted, an artist with a Mac

One of the really interesting things we can do with this new equipment is to bring you lots of visual information. We can include sketches of interesting equipment and really fine layouts of construction kits with enhanced drawings and plans. This will make it easier for us to bring you more do-it-yourself projects than ever and still have lots of space for other things too.

However, although we have lots of audio circuit design talent around here, and pretty fair communication skills, we are really short of artists. I can barely draw a beer, and cannot draw flies unless I have skipped baths for a while.

I would sure like to get together with an artist with a Macintosh who would like to come up with a few 3.5" floppy discs full of “clip art” for us. We could use sketches of most of the chassis we work with. For example, everybody wants to know what a Super Pas Two looks like and about the best I can do is this:

Obviously, we can use some help here to allow us to show you much more about what is going on in the world of audio, both on the outside of the equipment, and on the inside.

If we can load the artwork you create directly from a Mac 3.5" floppy disc into a file on our hard disc, we can then quickly access things we need to keep you better informed.

If you have the ability to help us and are interested, give me a call or send me a few samples on a Macintosh 3.5" disc. Perhaps a trade of equipment for services could be worked out.

This month we sent a postcard along with *Audio Basics*. It was from the Home Recording Rights Coalition to help you easily get your message to Congress. Assuming that you don't want all of your source material destroyed by the CBS anti-copy notch filter, fill out the card and send it in. They will see that your message gets to the proper congressman. The postage is already prepaid!

Some of you have written me that you need more detailed information about the issues and exact data regarding the file numbers of the bills, etc. before writing your congressman. Well, here is what you need. Call the Home Recording Rights Coalition (free of charge) at 800-282-TAPE to get more detailed information about the notch filter and its current status in legislation.

I am glad that I have now heard from many more of you about this issue since the last issue of *Audio Basics*. However, there still are far too many of you who have not done anything. Those of you who are not acting now are simply watching the fidelity of all future source

material you buy being risked. What good will that high quality audio system do you when a resonating high Q notch filter is stuffed into all your records, discs, tapes, and even FM broadcasts? You might as well get a boombox and ditch the expensive system because you won't enjoy it any more if CBS wins on this issue.

I'll try using a (such as it is) visual aid to show you what the notch filter is doing.

In theory, and as CBS incorrectly assumes, the narrow band notch filter only removes a tiny chunk of information about 50 Hz wide. If the filter worked perfectly, you would probably never hear that information is missing. The following is a crude sketch of what CBS assumes the results to be.

Unfortunately, steep notch filters don't work that way in the real world. The steeper you make the slope, the higher the “Q” of the filter (the more under-damped it is). High Q under damped notch filters **ring and oscillate like crazy!** The response is actually much more like this.

The filter adds to and subtracts from the frequencies near its fundamental over a frequency range much wider than just at the notch point. This distorts the music much more than the simple removal of a narrow band slice would seem to do.

CBS's claims are kind of like a doctor telling you that he needs to remove a tiny little slice from your liver - without telling you that he plans on doing it with a chain saw!

Now is the time for you to take action!

We make the “big time” again.

The fine review we received from Len Feldman in the June, 1987 issue of *Audio* is still bringing in inquires. This month we get space in another major publication. On pages 28 and 30 of the October, 1987 issue of *Digital Audio & Compact Disc Review* I was given the opportunity to write a guest editorial, through the kind interest of Daniel Kumin, the technical editor.

If the writing style in the editorial I wrote seems a bit choppy, it is my fault. I was informed in advance of the amount of space and the number of words I would have, and I overran my allocation. Actually everything was supposed to fit on one page so I got more space than I was offered. However, editors are there to edit, and Mr. Kumin did need to make a few careful cuts and condensations (with my permission, of course) to fit things into the space available. The ideas were saved intact, but the “flow” is not quite what I would want if I had all the space in the world available - but, I didn't.

Anyway, I am delighted with *Digital Audio's* interest and consideration. The editorial deals with the "all amplifiers sound the same" ideas expressed recently in *Stereo Review*, for example, and offers possible reasons why some people keep coming up with those opinions and getting those results in listening tests. Get a copy of the magazine and read the article.

Note also their huge quantities of easy to understand CD reviews. *Digital Audio* is the magazine of choice for Compact Disc evaluations that you can usually trust. You can subscribe for \$19.97 per year (12 issues) by writing to their Circulation Department at P.O. Box 976, Farmingdale, N.Y. 11737-9676.

Our trip to CD service school

Aado and I spent September 21 through September 23 in Chicago at the North American Philips regional office at a CD service school. Gregg McArthur, our Chicago rep, joined us there. David Umeda had to say home and mind the shop, but is already learning the meat of our education. The training session is required for us to be directly authorized to do our own warranty work for N.A.P. (We do our own CD service now, of course, it is just that we don't get paid for warranty service by N.A.P. and we don't get free warranty parts).

The experience was educational and very interesting. We learned a lot of things, actually more things than they were formally teaching.

First of all, the instructor and all the others attending were service technician types and they didn't have much use for engineering types like Aado and me. They made a lot of assumptions about us that they shouldn't have - especially when Aado and I cleaned up on them during the last day troubleshooting session. Each "team" got a 1041 CD player "bugged" with twelve different nasty problems. Each problem could be switched in and out through an external switch box connected to the CD player through a multi-conductor ribbon cable. We had to switch in and solve each problem, in order, without damaging the machine and without touching it with a solder gun. Only measurements and wave form analysis were allowed. We had to trace the problem right down to the exact part, and tell whether that part was open or shorted, (or somewhere in between). There were even open foil traces. At the end of the day, Aado and I had correctly solved more problems than any other team. One team destroyed their machine early in the process - as did the instructor the day before in training. The technicians were all rather surprised to be "out-serviced" by engineering types. They assume that engineers are there to make problems for them, not to solve problems.

We learned a lot about the "service technician" mentality - the mind set they have when they deal with you - developed in part by the mind set you have when you deal with them.

When the instructor asked, "What is the complaint the customer has when he brings the unit to you for service?" the unanimous answer the class shouted out was, "It doesn't work!" That's what you, far too frequently, tell the service technician. Thus, the typical technician assumes now that you are not going to give him any useful help in explaining what the problem is, and in the rare instances when you do, he ignores your input because his experience is that your data is usually wrong. Interesting how customer and service technician can condition each other, over time, to not communicate effectively at all. It is also interesting to consider how much extra money that costs you in extra troubleshooting time because poor communications make it harder to zero in on the problem area.

We also found out that service technician types really like manufacturers to build equipment with "weak links" that fail often, but are easy to find and fix - at not too high a price. That way they get to make easy fixes to many products time after time and make lots of money. When we mentioned that we have never had a single Transcendence Series Two amplifier fail in the field, they didn't like that method of design and construction at all - if everything was done like that, they would be out of business.

Obviously, the service technician type is not ever going to do a "better than stock" fix. When a trouble spot in a given type of unit fails, the standard repair is a simple "in kind" repair only, putting the equipment back in original condition and containing the original trouble spot, ready to fail again soon. This guarantees more future repair business. The idea that the thing to do was to make the repair so that the trouble spot is eliminated - to put the unit into better than original condition where desirable - was alien.

We also noted that the service technician's idea of "distortion" is that which you can actually see on a test bench scope (about 20% or greater or a absolutely scrunched wave form). Don't go in with a complaint that the "sound is a little dry" or "the flutes are displaced two rows to the right" and expect to get any sympathy or help. Note that "all CD players sound exactly the same" was the rule of the day at the school from staff and students alike.

Thus, the service technician, usually experienced and well trained in servicing the equipment he is authorized to do warranty work on, has a learned mind set you need to be aware of and to understand.

He expects no help from you and tends to disregard your specific complaints when you make them, because his past experience tells him that on the average, your diagnosis is probably wrong. He has no emotional interest in the equipment - it is simply another broken mechanism to put back into functioning order. He is trained to fix it according to the manufacturer's service schools he has attended, and according to the manufacturer's specifications, nothing more, nothing less. He is not interested in the equipment beyond the basic repair. To make a decent living, he must quickly turn to another repair job. Careful listening to the equipment or an extended bench or sonic evaluation is simply out of the question. This would raise the cost of the repair to more than you would ever choose to pay. You get to make the extended burn in and the final quality control checks after you get the equipment back home. With today's labor costs, that time simply cannot be built into normal service procedures.

There is a saying in the trade, "you don't replace the clock in a clock-radio" that you need to understand too. Simply, this means that when the cost of the repair exceeds the replacement value of the equipment you don't repair it.

One problem in our economy is that most consumer electronic products are made "off-shore" with \$2.00 per hour labor, but are repaired here with \$40.00 per hour (with overheads) labor. This rapidly sets upper limits as to the possible scope of repairs, and takes more and more products into the "disposable" category. Please understand this when we tell you that a sick CD player you have sent to us for our new audio circuits (and hopefully a cure) cannot be economically serviced and should be replaced.

Anyway, enough rambling about the philosophy of the training school, the real question is what did we learn that is of value to you? Actually we learned quite a lot, first of all, a simple and very effective new way of inspecting your CDs for playability flaws. And boy did the class instructor have a good supply of CDs with really impressive flaws and reasons why they get damaged easily. This was discussed in detail early in the program because so many CD player problems are not player problems at all, but CD disc problems themselves.

Look through your CDs for flaws.

While you are probably used to carefully inspecting your CDs for dirt and scratches, **did you ever think about holding a CD up with a strong light behind it and looking through the CD (or through any holes in the reflective coating)?**

When you try this with many of your CDs, you are going to be surprised, and the results may not make you very happy. Refer to the cross-section diagram of a CD.

When the CD is manufactured, first the clear base material is stamped from a mother to impress the pits into it. Then it is very carefully electroplated with the aluminum reflective coating. Next, it is supposed to go through another process in which a clear protection layer is placed over the reflective coating, to insure long term durability of the CD. A lot of CD manufacturers are "cheaping out" and are **skipping the protection layer step**. After all, the CDs still play, and it saves them money. They simply stick a paper label on or just print the label data on the back side of the reflective coating itself.

If the reflective layer is damaged, then laser light goes right on through, instead of reading the pits, and data is lost.

You can see for yourself how many holes you have in the reflective layer of your CDs by holding them up to a strong light and looking for "pinholes." Each pinhole of light you see is data missing from your CD. If the holes are too big, the problems become audible, and eventually, cause the CD to not play at all.

The first bad thing you are going to find when you try this yourself is that there will be at least some small pinholes in nearly every CD in your collection.

The next bad thing is that some of your CD producers are really getting cheap. They have skimped on their reflective coating so much that you **can actually see right through the CD - completely through the metal layer!** If you can see through it, then (unless by chance the coating is more opaque at the wave length the laser operates at) the laser is going to partially see through the disc too, and part of the signal is lost. Since the circuits need all the signal they can get, a weak signal will likely cause load and playability problems. If you can see through a CD and have tracking problems with it, take it back and try another sample to see if the insufficient coating was a sample problem or if all in the production run were done that way.

Anyway, back to a few more obvious problems that occur when the protective coating is omitted. First of all, don't ever use tape to stick a note or whatever to the label side of a CD. If the protective layer is missing, when you remove the tape, the reflective layer will come right along with it, absolutely ruining the CD (this makes very big "pinholes"). Also, just because some CDs have paper labels, don't assume you can write on them. If the protective layer is

missing, writing on a paper CD label can easily crush the pits and again, ruin the CD completely.

Finally, if the base material layer of the CD is too thick, then the reflective layer may be too far away from the laser when it is used in your player, and out of range of exact focus capability of your machine. That too will cause playability problems. In our collection, some of the early Fresh Aire CDs are excessively thick and do cause playability problems. I am not wild about that considering that American Gramophone could have put two records on each CD (the records play time is so short) and they were premium priced in the first place. Considering that they also tried to slip in a cardboard holder, and never answered my letters to them, puts them way outside a class operation in my book.

Another thing we learned at the school is that there is another new model CD player coming from Magnavox, but one that you probably won't want to buy. I am going to be very interested in how you read this data because many of you like to read into what I say what you want to read, not necessarily what is really there. Note that the service school didn't tell us this is a model to avoid, in fact they liked it just fine! The idea that you might want to avoid one new model is mine, based on the fact that it is a -

Pioneer CD Player from N.A.P.

That is right, Magnavox has gone to Pioneer (instead of their parent company Philips) for a new six disc CD changer! Does it have 16 bit times 4 oversampling technology and Philips digital filters? Are you kidding! It is a Pioneer, only the nameplate has been changed to hide that fact from you.

I complained with vigor about this, and nobody there could understand my point of view - all CD players sound the same, remember?

I pointed out that when GM tried stuffing Chevy engines in Oldsmobiles, they got their socks sued off and that Magnavox was asking for the same treatment. I tried to explain that Magnavox's reputation in the CD field is due to the great reviews (deserved) their Philips designed and built digital filtering machines have always had.

I pointed out that the only value of a Trademark is so the customer can have faith in the consistency and quality of the product produced under that trademark. That a trademark gains favorable recognition slowly due to the long term actions of the company and that once a good reputation is established, then to misuse that trademark is to break faith with the customer.

I pointed out that today, when a customer buys a Magnavox brand CD player, he expects to get, and has a right to expect, a Philips produced digital filtering machine. I suggested that slipping a Pioneer to the customer under the guise of a Magnavox trademark is tantamount to fraud! I told them to expect a class action suit when they get too many consumers unhappy about this.

Guess what the response was? I was told, "but how is the consumer going to find out that our new CD changer is a Pioneer?" "That's easy," I replied, "I am going to inform all my readers in the next issue of *Audio Basics*." So, dear reader here is that news as I promised Magnavox.

Note that **only the 6 disc CD changer is a Pioneer, every other model is Philips made and still very desirable**. Another way you can tell is that the Pioneer machine loads and plays the CDs upside down. It is the only one in the Magnavox, Sylvania, Philco line that does this. I guess if I wanted a Pioneer I would buy a Pioneer (and wouldn't be writing or reading this). I think Magnavox is wrong and I am sorry they don't understand why. We will continue to use only their Philips technology as long as it continues to provide the most cost effective high quality CD read and play capability.

We did get one bit of good news at the school, and a favorable change in policy by N.A.P. regarding servicing of their CD players. Up to now, the parent company Philips has only provided repair (and warranty) parts on an individual parts basis - complete easy to replace sub-assemblies were not available. They didn't seem to understand that some repairs, such as laser replacement in a CDM-2 transport could easily exceed the cost of the whole machine. In fact, one reason we went to the school was to learn if there were any "insider" short cuts to laser replacement that would make this project cost-effective. No training in laser replacement was given at all, and we were wondering about this until the end of the school.

That is when we got the good news that N.A.P. is now going to start making complete CDM-2 turntable assemblies available as a replacement part for both warranty and non-warranty situations. Evidently their own service people at N.A.P. cannot cost effectively fix the transports either. Please understand that we, and others can fix the transports - knowing how is not the problem - the problem is that after two hours of bench time this is no longer cost effective - and it does take over two hours to do the job. Its the old clock in the clock radio syndrome. The discount prices for new units sets upper limits on how much service time is of value. Anyway, the entire transport can be replaced in only a few minutes, and much less

troubleshooting time is needed to decide simply that the transport (containing the laser, the motor hub, the control preamp PC card and all the feedback loops to the laser drive) is defective than to figure out exactly what part is bad. Because complete new transports will soon be available, many more machines will be serviceable in the future.

Don't send us 650s for rebuild.

Although the CDB 650 is a Philips made 16 bit digital filtering CD player, it is the **first generation of these products and so far, by far the most troublesome**. In fact, to date, not a single 650 has made it through our quality control process for rebuild - every single one has to be returned as is because it was too sick to rebuild. Thus, we recommend that you not send us any more of this model for our circuits, they just are not working well enough.

Super Pas Two Power Supply.

The **do-it-yourself kit version** of this superior new power supply is not available yet. It is going to take me about 90 days before I have enough command of the graphics capability of this machine to write the necessary directions for this kit, which must interface with several different circuit iterations. This significant upgrade is available as an in house \$150 project and is standard on all new Super Pas Two units and complete rebuilds. It is not part of the \$125.00 Super Pas kit. There is no such thing as a Super Pas Three nor is the phase inverter board available in the Pas chassis. Ignore these data errors in the listing of our products in the new *Audio* annual equipment directory.

Well folks, that it for now. Stay with us and watch our progress as we learn to do more and more with this little Mac SE.

Frank Van Alstine

VOLUME SIX NUMBER TEN OCTOBER, 1987

Hurrah for the Minnesota Twins and their fans!

For they have shown everybody what 120 dB sound pressure really is (and broke ABC's sound pressure meter in the process). 120 dB is what you get when you pack 55,000 crazed Twins' fans into one closed stadium and have them all shout and whistle their lungs (and ears) out over the prospect of finally having a Minnesota championship. You have got to understand - after Hubert Humphrey, Walter Mondale, four tries by the Minnesota Vikings, and the shutout thrown at the Twins by Sandy Colfax in 1965, we have been really starved for a winner. We made a lot of noise when the win finally came. If you saw the pictures of "the Dome," the lid lifting off from the roar of the

crowd, then you have some idea what 120 dB is like. Lots of hi-fi salesmen will try and tell you that a powerful audio system will put out 120 dB. Not likely! The B&W 808s with a kilowatt a side driving them will do it, short term, on transients - but, duplicate the sound of that stupendous crowd on a sustained basis - no audio system can. The St. Louis Cardinals know what 120 dB is now, and if you follow the sport, so do you. Remember that the next time the talk gets around to how loud a good audio system will play.

Learning Hi-Fi in College?

Often my younger readers write me to ask, "Can you recommend a college for me that has good course work in high fidelity design?"

I regret to inform them that I don't know of any college that has electronics courses specializing in audio design. There are many colleges, of course, with good Electrical Engineering and Physics departments (and with the Math department there to give you the tools necessary to learn the Physics) that can teach you the fundamentals of electronic theory necessary as a basis for later original design work. I should also caution that the basic electrostatic and magnetic theory courses are likely to be the most difficult in a given college's entire course catalog (at Carleton College, my daughter's "E & M" course is called the "S & M" course by everybody who has been subject to it).

There are however, some good strategies to follow in picking a college if audio is of great interest to you. Pick a school that has an excellent reputation in all of the following:

1. A school strong in math and physics.
2. A school with an excellent performing music department.
3. A school with a good regional broadcast radio station associated with it - more than just a little cubbyhole of a low powered campus station.

You can then learn the basics in the science departments, and put the knowledge to practical use working for the school's radio station as your student job helping record and broadcast the musical performances the performing arts department presents. You will get your hands on all the basics of audio reproduction, recording, mixing, and broadcasting equipment, and come out with useful skills in addition to theory.

The radio station's chief engineer will really like to get a hold of an audio enthusiast for a student job too as most incoming freshmen don't know anything more about audio equipment than stuffing a cassette in a Walkman. From another practical viewpoint, a radio station job sure beats washing dishes.

An example of a fine school that meets the criteria above (but by no means the only such school) is St. Olaf College, Northfield, Minnesota 55057. They have a nationally known math department, one of the finest performing arts departments in the U.S.A., and the PBS radio station WCAL is part of the campus with outstanding broadcast engineering and production talent. They have got everything you need to become an audio design specialist if you want to put in the work necessary.

I am sure there are schools close to you too that can do the job. Just keep in mind what capabilities you need and pick a school that has those resources.

Thanks for helping fight CBS.

I have now heard from many of you with copies of the letters you sent your Congressmen asking for the defeat of the CBS anti-copy notch filter scheme.

No, my goal is not to rob recording artists and studios of their rightful royalties. There are many safeguards to prevent that without additional analog anti-copy filters on the original source material, and the studios had better first check their assumption that if the consumer can make good reproductions of source material, it will hurt their sales.

The video tape recorder industry presented that worry to the movie studios a few years ago, causing Disney and others to sue Sony to limit the use of VCRs. Sony won, the courts affirming that a private person has the right to make copies of video programming already provided to him for his own private use.

What happened then to the income of the movie studios as the use of VCRs proliferated after that decision? Did the "free copies" hurt them? Nope - the movie business got better than ever - feeding all those VCRs. Can you imagine what the movie production business would be like now without video rental stores and without cable systems telling their viewers to "tape the movies so you can watch them at your convenience"? The advent of VCRs helped the movie business a bunch. So too will the DAT help the music business by making the work of more artists more widely known, at a much higher level of quality at (eventually) a lower price.

It really doesn't take much skill to make that prediction - it has already happened with the analog cassette recorder. Analog cassettes did not put a dent into record sales - they have simply added a huge additional product category - pre-recorded audio tapes - to the sales of the music industry. DATs might replace analog tape cassettes as their prices come down, much as the CD is slowly replacing records now, but that is all to the good as the DAT is of much higher quality.

DATs are going to make the recording and music industry great gobs of money in the long run. Why industry officials have their head in the sand about this I cannot understand.

Finally, they don't need the analog anti-copy notch filter to prevent making direct digital copies of CDs. You cannot do that now in any event! Nearly every CD has a "don't copy me" code built into its addressing code (not part of the music). All DATs (including the PCM units used to turn VCRs into digital tape recorders such as I use) have circuits that acknowledge that digital "don't copy me" message and won't copy when they see it. This only happens with an attempted direct digital transfer, not after the music comes out the normal audio outputs on your CD player - then the digital message is gone.

There is good reason to limit direct digital transfers - it actually gives the user a "clone" of the producer's master tape - this would make things a bit too easy for professional pirates. The copy you can make, an analog transfer from your CD player to your DAT is still outstanding in quality (and day and night better than any home analog cassette recorder) but it does show some loss and will allow the industry to catch counterfeits. So lets encourage DATs instead of making them illegal and ruining the program material in the process. Don't get carried away though, not at \$2000 for a machine. Let your rich friends buy the first ones - you can be patient and wait for the prices to drop to under \$500.

DAT will help all of us.

When the prices are right the DAT will be a major enhancement to your audio system. It will finally be a good way to get high fidelity sound into the car and into portable systems. It will give high quality recording capability to everybody - and hopefully give many talented amateurs the chance to go big time with their recording capabilities. It will allow specialty companies to record obscure works and groups and produce special interest recordings without excessive overhead costs. It will make it economically practical to dig back into the vaults and release limited interest program material - material that now stays buried because the cost of tooling to CD is in excess of the expected profits on a small volume item. DAT is going to benefit you - if short sighted executives and Congressmen don't ruin it. It is up to you to see that they do not.

Wanted, digitizer information.

Here is a sample of the resolution of artwork we can bring into *Audio Basics* or a future catalog using simple 72 dot per inch resolution scanners:

This is a picture of our DH-100 preamp chassis, available with Fet Three, Fet Three Plus, and Transcendence circuits.

I want, and we can get, much higher resolution than this with a 300 dot per inch scanner (and by the next issue we will have accessed one and will have a lot of good artwork stored). However, there is a lot of visual material I would like to bring you that isn't on paper, ready to be scanned.

There are digitizers available that take their input directly from a video camera and put out a picture the Macintosh can store and use. Since I have an excellent black and white (not B&W - they don't make TV equipment) camera, a low cost digitizer would be really useful for us, if they work well.

So, that is the reason for the question. Have any of you used the Magic or MacVision digitizers with a TV camera? Did you get any useful results? Can you send me a 3.5" floppy with samples? The more you can help us, the better *Audio Basics* can get for you.

Special B&W MATRIX 1 values!

With the introduction of the B&W CM1 and CM2, the B&W Matrix 1 loudspeaker - although an outstanding performer - doesn't look as cost effective a value as it did before the new models. Thus, we have done something about that - lowered the prices on the Matrix 1. I have one new pair and two demo pairs (in new condition) available at \$750/pair (list price is \$1100/pair). They are walnut finish. We have the beautiful marble stands available with one demo pair of Matrix speakers for \$150 extra (list price is \$240/pair). Our prices include delivery to you in the continental U.S.A.

The Matrix 1 is a better overall speaker than the new CM1 - greater bass extension, dynamic range, and power handling capability - but is not equal to the combined CM 1 & CM 2 tower. Since our price of the CM 1 is \$550/pair and the complete tower is \$1400/pair, our new lower price on the Matrix 1 (while our inventory lasts) makes it a very good value. These are current production models.

Last call for the great B&W 802s

B&W is discontinuing production of the marvelous 802F Special loudspeaker because it simply is too expensive for them to make. There are actually more parts to put together than in the 801 (two woofers instead of one) with the identical concrete mid-range head and a bass cabinet just as costly to produce (just smaller).

As the dollar has decreased in value in relation to most foreign currency this year, B&W did something about the cost of the bigger 801F Special model - they made revisions to the

cabinet and drivers - and raised the price \$1000/pair! While the 801 Matrix, the new model, is still worth the money, even at \$4500/pair list price, they could not raise the price of the 802 model that much, so, they have quit producing them.

This is a real shame because at \$2500/pair they were a real wide-band powerhouse that actually fit into your living room. They handle great gobs of power, they play very loud, they have very extended deep bass response, they image like crazy, they are electronically protected, and they are extraordinarily neutral and free of colorations.

I have one, and only one, brand new pair of B&W 802F Specials left (walnut) at \$1800 for the pair delivered to you in the continental U.S.A. Give me a call to get your dream speakers before they are all gone.

A hint of things to come.

The learning process of what I can do with the graphics capability of this little Macintosh has been extensive and is ongoing. The object is to be able to bring you a better *Audio Basics*. One thing we want to bring you is better do-it-yourself projects. In the past I have shied away from offering some of our simpler new PC card preamp circuits as do-it-yourself kits because I didn't have the capability to document the board layouts for you adequately. Now, take a good look at the next picture:

It is a reduced version of one of our stereo RIAA phono preamplifier circuit boards. It will be very easy to follow this layout when expanded to full size.

In 1988, I will have at least one of our Super-Fet preamp circuit sets for the older Dyna and Hafler preamps written up as a do-it-yourself project. Don't throw away that old DH-101 or PAT-4, and don't let your subscription expire!

Meanwhile, back at the fuses -

In the August issue we closed by asking you to think about why slow-blow fuses are not good for protecting loudspeakers. The reason is, of course, that they take too long to blow - causing the speaker to blow first, thereby protecting the fuse. We want a big overload to blow the fuse right now before the woofer bottoms and is damaged and before the tweeter fries. A slow-blow fuse does not blow on short term big overloads so it offers poor loudspeaker protection.

Fuses work because the passage of electrical current through a substance generates heat, depending upon the resistance that substance offers to the flow of current. The active element in a fuse is selected to have just the right combination of resistance and melting tem-

perature so that when the current exceeds its rating, the temperature rise will melt the element, opening the fuse.

The relatively large rectangular block inside the slow-blow fuse acts as a heat sink, storing the heat generated from a short term high current and then dissipating the heat slowly after the excess current has passed, without melting the element itself. Only after enough current (heat) has occurred to overcome this heat sinking capability will the fuse open. Note that a dead short (such as a blown power supply diode) causes a huge over-current, generating enough heat to vaporize and plate the element all over the inside of the glass tube rather than just parting the element.

Note also that a good service technician can tell a lot about a failure mode by looking at that blown fuse. Don't throw the bad fuse away before taking the unit in for repair. The "evidence" it provides the repair agency may save you service time and cost.

Don't worry about the resistance of the fuse "harming the music." It is only a small fraction of the resistance of your speaker wires and speaker voice coils. You can hear the effects of speaker fuses only if you don't use them and subsequently blow up your speakers or amplifier. Then you can hear the effects of not using fuses - you won't hear any music at all!

You also need to know that far too many speaker manufacturers inflate their claims about the power handling capability of their loudspeakers. And even if the speaker system, as a whole, can handle, for example, 100 watts of music power, that is not the power it sees when something goes wrong!

Your loudspeaker system is designed to handle a music signal - a signal composed of many frequencies at the same time. The crossover network in your speaker sorts out those frequencies and sends them to the appropriate woofer, mid-range, and tweeter. The speaker designer knows that in real world music, less than 10% of the power is in the highs. The designer also knows that to handle lots of power, a speaker must have a massive voice coil, magnet, and structural parts - just what you don't need for efficient fast response from a tweeter. But because not much of the music power is in the highs, the tweeter can be made delicate enough to respond fast efficiently. You get a tweeter that works just fine on music, even if it has to be built small and light enough to handle only 10 watts or so of power. On music, it will never see 10 watts so everything is just fine.

However, when an overload occurs, the signal to your loudspeaker is no longer music! The signal produced when your amplifier is pushed too hard and starts clipping (distorting) con-

tains a much greater percentage of very high frequencies than undistorted music does. This is because clipping produces "sharp cornered" wave forms that have excess high frequencies. All of that distorted energy is sent straight to your tweeters - burning them out. You may not even know anything bad is happening because the distortion products can all be above the range of human hearing. But your tweeters can "hear" this excess energy and heat, and they go "poof"

Luckily, fuses can "hear" the problems too, and, if properly selected, will blow first, saving the speakers. Use them!

So then, now that we know what kind of fuse to use, lets go back to the power amplifier, its problems, and what fuses have to do with them. There will be several fuses in your power amplifier. A likely configuration is as follows:

1. A single slow-blow line fuse ahead of all internal circuits. This protects the power transformer from power supply failure.
2. Separate quick blow B+ and B- fuses for each channel, after the power supply, but ahead of the internal audio circuits. These fuses (usually four in number) protect the power supply from audio circuit failure, and protect the audio circuits if the external speaker fuses are too large or are jumped out.
3. Two quick blow speaker fuses user accessible on the back or front panel of the amplifier. Again, these protect the speakers from system overloads and the output circuits from defective speakers and shorted wiring.

Usually the main fuse is rated between 3 ampere and 8 ampere depending on the amplifier power, the B+ and B- fuses are rated between 2 amp and 6 amp (again depending upon amplifier power), while the speaker fuses will be between 1 amp and 5 amps, depending upon the power handling of your loudspeakers. You must save the instruction manual for your amplifier and speakers to know what fuses to safely use when one blows.

The fuses will fail (especially the main slow-blow) all by themselves, once in a long while, just from stress and old age. Each time the unit is turned on there is a short current surge and a slight over stress of the fuse. This heats it up and cools it off. Over time, the many on-off cycles cause metal fatigue in the fuse and it finally fails. If a replacement holds then you had no other problem.

Note that usually the internal B+ and B- fuses should be replaced in pairs (if one failed, the other for that channel was over stressed too). Note also that the power supply capacitors

must be discharged before replacing these fuses or the new replacements will blow when installed.

What happens is that when the fuse blew, it disconnected the power supply capacitor for that half of the supply from the load (the audio channel). That capacitor may stay charged, unless there are circuits built into the amplifier to slowly discharge it. If the fuse to the other half of the supply did not blow, then that power supply capacitor will discharge through the circuit. Thus, when you start to replace the power supply fuses, you may have one half of the supply charged and the other half discharged. When you install a new fuse, the unbalanced power supply condition immediately drives the amplifier to the rails (full DC offset in the direction of the charged supply) which will instantly overpower the new fuse and blow it! Installing another fuse brings the same results until the surges finally discharge that half of the power supply. In most amplifiers, all power supply capacitors need to be discharged (a 100 ohm 5 watt resistor works well) to insure a balanced power supply condition before starting to install new internal fuses again. Note that most AVA amplifiers have internal bleeder resistors on the supply caps to slowly discharge them if abuse has blown the supply fuses although it will take an hour or so for the supplies to drain down.

That is probably more than you ever wanted to know about amplifier fuses, so lets change subjects for a little bit.

Please check your mailing label!

There are two different things to look for. First of all, we have transferred all of your names and addresses into a data base system I have designed under HyperCard on the Macintosh to take advantage of its high quality printer, to use HyperCard's fast "find" capability allowing me to bring your records up on line real time, and to free up the big computer for number crunching. Because the two systems are not compatible, we had to key everything in again by hand - one reason we are late this month - you cannot believe the hours of work! Anyway, look at your label very carefully for typos and inform us of any mistakes so we can correct problems promptly.

Second, look at your expiration date, the four digit number to the right of your name. 8710, 8711, 8712, or 8801 means that your subscription expires soon. The number means the year and month your subscription expires. If you want to stay with us, please get your \$16.00 renewal in now before you forget about it or it gets so close to the Christmas season that you are too busy to. Thank you!

Frank Van Alstine

VOLUME SIX NUMBER ELEVEN NOVEMBER, 1987

CBS Sells Records Division to Sony for 2 Billion Dollars

Well, maybe we have taken care of CBS records division's anti-copy notch filter plans by, instead of getting rid of the notch-filter scheme, getting rid of the whole CBS records division itself (how I hope!). It is going to be interesting to see what happens. Sony, being one of the original designers and proponents of the digital Audio Tape Recorder, has been in direct opposition to CBS records over this matter. Now that Sony owns CBS records, will there be a little coercion used to make the ex-CBS managers see the light? One certainly hopes so. However, Sony is reported to be paying Walter Yetnikoff (the long time CBS Records head) \$20,000,000.00 and a management team of ex-CBS execs another \$30,000,000.00 to stay with their records division. Why are they willing to pay the same people who don't want them to make or sell DAT recorders 50 million dollars to run a branch of their company for them? You figure it out.

Note that CBS already sold off its magazines earlier this year so that *Audio* and *Stereo Review* are no longer owned and run by them. That should make it a little easier for these magazines to continue the fight against the anti-copy notch filter. We must continue the fight, the issue is not dead yet!

Good Sources for Parts

One of my long term readers, K. E. Lang, 6501 Lancret Hill Circle, Austin, TX 78745, phone 512 441-3479 is supplying a nice assortment of audiophile parts that may be of use to you. The samples he has sent me are of very good quality. In particular I appreciate his non-magnetic high strength phono cartridge mounting hardware, his heavy duty solid brass speaker terminal hardware, his tonearm damping compound, and his "ultimate" tube dampers - which might be better than the ones we use for a lower price - he only sent me one sample and I need four of them to try - hint, hint.

He also has good quality capacitors available at reasonable prices along with speaker and hookup wire, and even "wonder solder" (nobody's perfect). I have known Colonel Lang for several years and can recommend that you write or call him for his catalog if you are looking for this kind of no nonsense high quality parts.

Digi-Key Corporation, P. O. Box 677, Thief River Falls, MN 56701-0677, phone 1-800-344-4539 is a great source for high quality Panasonic film and power supply capacitors, metal film resistors, and other electronic parts of all kinds. This is a professional stocking

distributor of very high quality that is still willing to sell parts to individuals in small quantity lots. Call or write them for their catalog.

Stereo Cost Cutters [now called Sound Values], Box 551, Dublin, Ohio 43017, phone 614-889-2117 remains a great source for Dynaco parts. Several years ago, they bought out a couple of hundred thousand pounds of parts from Dynaco when Tyco Labs "pulled the plug" on that division of their conglomerate. They still have lots of good parts available for you, and in fact, still produce some very good values in complete Dynakit! For example, they sell a complete Dyna St-410 amplifier kit (200 watts per channel) for only \$250.00. It is an old bi-polar design, but at that price is a great value for the do-it-yourselfer. (Our Mos-Fet 400C circuits can be installed in your St-410 for \$650.00 if you want a state of the art high powered amplifier). Call or write them to get the SCC/Sound Values catalog.

Why X4 Oversampling is Better

A reader wrote to ask why times four oversampling is "better" in CD player technology. The following simple graph gives you a good idea why times four oversampling (Philips technology) indeed is better.

Basically, it is because the residual "trash" that must be filtered out is at a much higher frequency with four times oversampling, and is much easier to filter out with much less sonic damage.

The output of the CD player's D to A converter(s) contains a substantial amount of 44 kHz trash - essentially the "stairstep" sampling frequency data along with the music. This high frequency garbage would destroy your amplifier and tweeters (and make all the radios, TV sets, and dogs in the neighborhood unhappy) if it got out of the CD player. Thus, the output stage of the CD player must contain filters for each channel to remove the 44 kHz crud while retaining flat frequency response to 20 kHz.

The problem is that there are several big problems with steep filter slope designs necessary to kill the trash at 44 kHz while at the same time preserving flat audio frequency response to 20 kHz.

- Steep filters have high "Qs" with severe resonances similar to the CBS notch filter we showed you in the September, 1987 issue of *Audio Basics*.
- Steep filters require many, many passive parts and are very critical of parts value tolerance. It is nearly impossible to build any two filters the same under production line conditions, even if precision parts are used (and with Japanese CD players, they

aren't). Thus, no two CD players, or even the two channels of the same CD player, are the same. There is substantial variation from sample to sample. This is not the way to get good imaging.

- To make matters worse, the multi-pole steep slope filter requires many active drive devices, the output - filter circuits look like a refugee from an amateur op-amp cookbook. Running the signal through a whole series of 25¢ op-amps isn't my idea of the way to preserve the music.

Of course, many of the Japanese suppliers "cheap out" even further by using a single D to A converter instead of separate D to A circuits for each channel. They "switch" the left and then the right channel information through the D to A many times a second assuming that you will not be able to hear the difference. The problem is that the switching causes a timing difference between the two channels, a difference that grows larger as the frequency of the music increases. This essentially is phase distortion - an artificial frequency dependent phase difference between the two channels that simply destroys the integrity of the "where it is" - the imaging information of the recording.

In contrast, the Philips invented times four oversampling and digital filtering technology is much nicer to the music.

- The basic digital signal frequency is multiplied by four before the audio is sorted out and the large scale integrated circuits that do the sorting and decoding also filter most of the switching trash out too.
- The remaining switching garbage is also essentially multiplied by four and comes out at 176 kHz instead of at 44 kHz so that a much gentler filter slope can be used to get rid of the trash.
- Gentle filter slopes are much easier to build, using many fewer parts and many fewer active devices, and have low, non-resonant "Qs." In most Philips machines, only a single simple dual op-amp is used per channel. The frequency response of a low Q filter is much less sensitive to parts value tolerance so that it is easy to build two channels that are exactly the same - good imaging can be preserved.
- All Philips technology machines (even the lowest priced) use two separate D to A converter circuits so that there is no dynamic phase shift between the two channels. Again, good imaging data is saved.

[1990 Note: This information is not true any more. Most Magnavox branded Philips made CD players now are built for

department store and discount store distribution, and are designed for low selling prices, not high musical quality. The times four digital filters, oversampling circuits, and dual D to A converters have been eliminated from many models. It is very important that you check with us before buying to insure that the model you are considering still has the high end circuitry necessary for accurate musical reproduction. Note that all CD players we sell do have the high quality circuits].

Finally, you might notice that every company that is trying to build a high end CD Player is using the Philips technology - Mission, Meridian, California Audio Labs, McIntosh, A.V.A., - even Sony! One reason, it would be nearly impossible to replace the entire glut of ICs and multi-pole analog "brick wall" filters in the typical Japanese CD player design with high quality circuits at a real world price. You would need a station wagon full of discrete circuit boards. Nobody would be able to pick up and carry the machine home, let alone afford to buy it.

With the much simpler output - filter stage needed with the Philips chip set, it is very practical to design a state of the art replacement for the mundane consumer grade circuit Philips uses in all their machines. A good designer can get very useful musical results at a price you can afford to own.

Regarding Sony, it is kind of funny. They keep advertising better ES series CD players year after year, and finally, at the very top of their line comes their best of all with - you have got it - the Philips times four oversampling chip set! The way Sony finally builds a good CD player is to not build a Sony at all, but to build you a high-priced Magnavox! What is Sony trying to tell you - they are trying to tell you to buy Philips CD technology, that's what! Take their advice.

Stereophile Prints Our letter!

Check out the December, 1987 issue of *Stereophile*. In the Manufacturers' Comments section (pp 169-173) they have published, unedited, a recent rather long letter I wrote them regarding their "non-reviews" of the Super Pas Two. You will find it enlightening.

Our CD Choices for Christmas

Its time to tell you again of some of the new CDs I like. CDs that combine good music with good production engineering so that the fidelity of the recording is as good as the fidelity of the performance (I demand both!). Hopefully, some of these CDs will make somebody you know a very nice Christmas present.

- k Telarc CD-80137 *Nutcracker*, Original Motion Picture Soundtrack. (Two disc set). This is the complete ballet score of this Tchaikovsky performed by the London Symphony Orchestra. It brings me closer to going to the live ballet performance than any other Nutcracker I have heard. It is a real must buy for this holiday season.
- k Telarc CD-85502 *Liza Minnelli at Carnegie Hall*. (Two disc set). This sets new standards in "how to" record a real time live stage performance and get real time live results. A wonderful recording job and a wonderful singing performance.
- k DMP CD-457 Warren Bernhardt *Hands On*. Tom Jung at DMP is capturing small jazz groups with the same faithfulness to the intent of the music as Renner and Woods do with big productions at Telarc. This, or the other DMP Warren Bernhardt Trio recording, will tell you what cymbals and string bass can really sound like.
- k Telarc CD-80122 *Pomp & Pizazz*. This Cincinnati Pops Orchestra recording of marches and such exhibits three dimensional space about as well as it can be done. If your friends don't understand the terms imaging and sound field, this is the CD to play to demonstrate musical space and air as well as it can be done.
- k EMICDC-7474542 *Kiri Sings Gershwin*. You should have at least one Dame Kiri Te Kanawa recording to enjoy this so smooth operatic voice (no shrieks here at all) and this all digital recording does her justice.
- k RCA RCD1-4436 *The Village Band* A nostalgic recollection by the Canadian Brass. You need a Canadian Brass performance in your collection and this is a good one.
- k Telarc CD-80138 *Vaughan Williams Symphony No. 2 "London" & The Lark Ascending* Andre Previn & Royal Philharmonic Orchestra. I like this work and this performance and this recording job.
- k GRP GRD-9547 *Cinemagic* Dave Grusin. All the best of the GRP jazz stars (Grusin, Ritenour, Daniels, etc.) with the London Symphony Orchestra performing a lot of neat music with as always outstanding fidelity.
- k Telarc CD-80146 *Star Tracks II*. What you didn't get in Star Tracks I you get here. Wonderful dynamic music to impress your neighbors (even if they are still at home!) and to destroy your audio system with. Really fun stuff.

- k EMI Manhattan CDP 7 484132 DIDX 2474 *The Best of SLIM WHITMAN*. This new digital remaster of a direct to 8-track (I suspect) recording ruined my whole day last week. When visiting record stores, any time an over-anxious clerk disturbs my browsing in too aggressive a way, and insists that they "help me find something" I always ask for *The Best of Slim Whitman* knowing full well that nobody with any taste would ever record Slim Whitman to CD - and even if they did, no self respecting record store would have it in stock. Boy was I wrong! To my utter disbelief, last week a record store clerk actually came up with this Slim Whitman CD, and at an \$8.95 discount price that was so low that I could not refuse buying it, not after asking for it, without looking like a real ass! So, here it is, "Indian Love Call" yodels and all. Get a copy for somebody you like (or don't like) so they too will find out that the 10% distortion herein was not really the fault of their K-Tel boombox, it's clearly in the source.
- k Telarc CD-80086 Grofe: *Grand Canyon Suite* & Gershwin: *Catfish Row*. It is worth it for the blending of music with the real thunderstorm alone but it is the music, not the special effects, that makes this worth owning.

I hope these CD notes help improve your collection (or the collection of someone you like).

Taiwan NAP CD Players Are O.K.

In September I informed you that NAP was importing Pioneer CD Players with the Magnavox name on them because Philips does not make a multiple CD changer model. I pointed out that I considered this to be a misrepresentation because the potential customer would have the right to expect Philips 16 times 4 oversampling circuits in a Magnavox brand, and the Pioneer does not have Philips technology.

Some of you have jumped to conclusions you should not have - namely that any NAP machine made in the Orient is suspect. This is not true! Philips has manufacturing plants all over the world, including Taiwan. This past summer, Philips has started building some of the models you are familiar with in their Taiwan plant. These are the same machines that they make in Europe.

We have used many of the Taiwan made 460, 560, and 465 models and they are part for part identical with the European versions. The Magnavox CD player models that are made by Philips in Taiwan are identical to the same

models made in Belgium. Only the CD Changer, which is a different model, is made by Pioneer and is not really a Philips machine at all.

Note Regarding AB Letterhead

Running Out of Gift Ideas?

If all else fails, Audio by Van Alstine can prepare you a personalized, customized gift certificate, thanks to the newly found computing power of our pet Macintosh and some nifty built in artwork.

Simply send money and tell us what you want the certificate to say and we will do our best to turn out something nice for you. The "real" certificate will be about 7" wide by 5" high and will be on as fancy a paper as we can run through our laser printer. Do it before December 10th if you want to have it by Christmas!

Back to Power Amp Use Problems

A common complaint we get from users is the panicky phone call telling us that their audio system is producing a very loud hum or buzzing sound. Almost always, this is caused by an open ground connection where one of their signal cables plugs into the amplifier or preamplifier. The interconnect cable has become partially disconnected or a conductor is broken.

Each round interconnect cable actually has two electrical conductors - hot and ground. The hot or signal conductor is in the middle of the cable, the ground, or shield conductor is carried as an outer wrapped or braided (braided is best because it provides a better shield) shield wire at the outside of the cable, separated from the inner hot conductor by insulation, kind of like the following drawing.

The outer ground conductor serves two purposes. First, it completes the circuit carrying signal to one component from another. Second, it shields the signal conductor from external electromagnetic fields. If the signal conductor fails (goes open) no signal will pass. If the ground conductor fails or opens, a much worse problem occurs, an "open ground" condition in which the shielding of the cable fails causing huge hum signals to be dumped into the equipment.

The open ground conditions is bound to happen to you sooner or later because of a design flaw in the RIAA phone jack and plug set used as a standard means of connection between audio components. The problem is that the set breaks (opens) the ground contact before the hot when the cables are disconnected. Look at the following sketch. Note that when you unplug a cable, the ground side opens up first which will cause that giant system damaging hum or squeal if you try to install or remove cables while the system is turned on.

Another problem is exotic interconnect cables. Many have non-standard dimensions (they are too big and too stiff). If the inner pin is oversized, it will deform the hot connection inside a standard sized plug and the next time you use a cable that is designed to specifications, you will have a loose and intermittent connection. Worse, if the outer connection is oversized then you are very likely to break connections between the grounds and develop that dreaded open ground system breaking hum. If the cables are too stiff, they are likely to pop loose from the connections, again causing a ground loop hum roar. We have always noted that yes, overpriced cables can make a big difference in the way systems sound. When their use destroys your system, you will hear the difference!

Thus, one simple way to keep your amplifier alive and sounding good - use rational cables and wires and make sure the connections are absolutely solid and reliable. We like snug fitting banana plugs on the speaker wires and standard RCA phono plugs on our normal full braid shielded interconnect cables, formed to give a solid firm fit on the jacks. We simply cannot understand how far out of the way and how much extra the neurotic audiophile will pay to acquire cables and wires that are likely to damage his system.

A Closer Look at the CM-1

We are so impressed with the musical performance of the new B&W CM-1 loudspeaker. It is easily the best "mini-speaker" we have yet heard. The combination of the new metal dome tweeter, the Kevlar woofer, the rock solid Matrix cabinet, the electronic protection circuits, along with the nifty included accessory stand makes this a speaker that is easy to use and pleasant to live with anywhere. The bass extends much cleaner and musically than you would ever guess for the tiny (9 5/8" high x 6 3/8" wide x 8 5/16" deep) cabinet size. When we play them alone (but mounted on their companion woofer towers) most people assume the woofer towers are turned on too!

These new B&W speakers exhibit a clarity and transparency that is seldom heard away from the live performance, and never before at this price. We charge \$650/pair for the CM-1s (available in a matte grey, white, or black finish) including shipping to you in the continental U.S.A. I cannot think of anything better for a highly refined small room system - unless you can afford to add the woofer towers too! Then you have a really stunning \$1650/pair floor standing tower system that obsoletes many multi-thousand dollar systems. You can buy the CM-1s first, and add the woofers later to avoid breaking the hi-fi budget all at once.

Look at Your Mailing Label!

There is a very good chance that it has a 8711, 8712, or 8801 date code. If so, your subscription is going to expire very soon and we will be sorry to see you leave. The renewal cost is just \$16.00 for the next year (12 issues) and I am doing my best to make it worth the money for you. Please get your renewal in to us now.

I want to hear from you with suggestions for topics for me to cover. I am interested in getting complete articles from you to include herein too. If I am overlooking something you think is important and that you know a lot about - write it up for me and see your work in print too! I welcome your help, and thank you for your support.

Frank Van Alstine

VOLUME SIX NUMBER TWELVE DECEMBER, 1987

B&W FINALLY GETS THE REVIEW IT DESERVES

At long last B&W has been recognized by some of the "heavy hitters" of the audiophile community. In the current, December, 1987, issue of *Stereophile*, the new B&W 801 Matrix Series Two loudspeaker gets eight pages of accolades. This is a review really worth reading. It confirms what I have been telling you for a long, long time. I am sure we will get reprints of this review from B&W of North America soon.

Not "News" to AB Readers

Stereophile "discovers" many things about B&W that all *Audio Basics* readers have known for a long time. First of all, they find out that B&W loudspeakers do not sound their best on typical Japanese receivers. No kidding! Garbage in - garbage out. They also discover that because most B&W loudspeakers are sold through mid-fi shops and are demonstrated only on Japanese receivers, that many audiophiles never hear B&W speakers auditioned really well and tend to write them off. They blame the boom and the harsh and non-dimensional sound on the speaker when, in fact, a great loudspeaker can only reproduce what comes in, for better or for worse (and with Japanese receivers, the for worse dominates). Mid-fi shops do best selling dull and slow speakers that mask and hide the trash their electronics are generating. Two "wrongs" do sound less obnoxious than one wrong clearly presented to you. But - better yet - why buy any "wrongs" at all?

The reviewers do have a bit of trouble getting really good bass definition, finding that they had to use speaker stands and very careful selection of amplifiers and wiring. Obviously

they are running under-damped amplifiers and not units with the control and DC stability of ours. We have never had problems getting profoundly clean and tight bass from B&W products. We have always heard the bass purity *Stereophile* is finally now realizing.

Now, about my hearing!

This brings up one minor "sore point." A couple of years ago, *Stereophile's* John Atkinson really laid into me in his CES show report - relating that I could not hear the difference between a string bass and a cello at an Apogee — Krell exhibit and didn't that prove what an ass I was. In this B&W review, the writers point out that the 801 gives the finest bass reproduction they have heard and state that they can finally hear the difference between a string bass and a low cello! Guess what, Mr. Atkinson, I have been using big B&W loudspeakers for years, properly driven, as my reference. Perhaps you might (in light of your own magazine's review) re-think your glee in reporting my lack of hearing acuity and publish an apology for your rather unenlightened (in retrospect) comments.

The CM-2 is noticed too!

In the same issue, in reporting on *Stereophile's* own New York hi-fi show this fall, they note that the new B&W CM-2 produced some of the best sound at the show (I have been telling you that it absolutely whumps on a lot of very expensive things)! Interestingly enough, the speakers were displayed with B&W's own electronics (which we do not like at all - they really screwed up my value judgement of the new products at the CES show last June). If the CM-2s would have been demonstrated to their real potential then everybody else at the show could have just packed up and gone home. You are not going to believe these little guys (\$1650/pair) until you hear them.

An "About Face" on the DH-330

Finally, a *Stereophile* writer reports that upon listening to a current sample of the Hafler DH-330 tuner that he now rates the unit (which he really tore apart a few years ago) as being one of the finest sounding tuners around. We have built many DH-330 tuners over the years. There is no difference at all in the circuits of the one the writer disliked before and the one that he finds is so nice now. The tuner has not changed - only the writer's perceptions have changed. When you have no controlled reference, your authoritative subjective opinion can drift all over the place and in this case the drift caused a real injustice to Hafler (and to people who bought an inferior tuner instead of a Hafler) for several years. We use a Sound Technology FM Generator as a very high quality miniature stereo FM broadcast station driven by our own source material in making evaluations of tuner

musicality so that we have a consistent and repeatable source we are sure of. Without a sure source, you simply cannot make accurate judgements of a component. The subjective review process must be "tightened up" substantially to provide repeatable accuracy (not fleeting whims) to the readers.

We may see you in Las Vegas.

A nice thing happened to us recently due to the kind interest of William Burton, the Technical Editor of *Stereo Review*. I have been invited to participate in a panel discussion at one of the Consumer Electronics Show seminars in Las Vegas on Saturday, January 10th, 1988 at the Riveria hotel. The discussion is entitled The Audiophile in the Digital Age (or something like that) and it is open to show visitors, of course. If you will be at the CES show, there is my chance to meet you - and I would sure like to!

Our Chief Inspector

Meet Pauline the Puma, the chief inspector for Audio by Van Alstine. Her most important job is to inspect the ports in the 801 Matrix speakers each morning to insure that no "little creatures" have moved in and set up housekeeping! It would be kind of embarrassing to have to call Orkin to shoo out uninvited guests - and I am not sure how well the B&W internal insulation and roach killer get along together. So far, Pauline has done her job very well and has not reported any invaders.

It is time for a Troubleshooting Diagram and Flow Chart to help you track down System Problems the Inexpensive Way!

So, here is a diagram of a typical audio system. Please study it carefully as reduced copies will be used further into this issue to illustrate specific hookup changes that can be done to easily isolate and identify a defective component or cable without the need for any test instruments, tools or special engineering training - just a little bit of common sense and logic - and don't panic.

Note that the selector switch on the preamplifier has been eliminated for the sake of making the drawings reasonably easy to follow. Obviously, it would allow selecting of only one source (Phono, Tuner, CD, etc.) at a time instead of blending all of them together as this drawing shows. The tape monitor switch and the volume control have been shown in their proper relationship to the circuits. Note also that your stereo system is really two mono systems packaged together! You have separate left and right halves of nearly everything. These "halves" can be re-connected to find "weak links" in the audio chain.

Now for Some Examples.

Look at the reduced version of the hookup diagram shown below. Note that two, and only two, changes have been made to it. First, the Right Line and Tone Control Section of the Preamplifier has been cross-hatched to indicate an example of a system problem. Second, the connection cables between the preamp and the power amp have been swapped at the power amp, left to right.

Referring to the Troubleshooting Flow Chart, we have noticed that we have lost the right channel of our system on all sources. The left channel still plays just fine. Obviously, this problem cannot be with an individual source (Phono, Tuner, CD, etc.) because the right channel is silent on all sources. Therefore the problem must be in a unit that is common to all sources, namely the speakers, the power amp, and the preamp line section (the preamp phono section is only used with the phono inputs). Thus we have followed the flow chart down the left side. When we swap the input cables from the preamp to the power amplifier (at the preamp) as the diagram above shows, what do we hear? Now we hear music from the right loudspeaker and silence from the left loudspeaker. What does this tell us? It tells us that both speakers are O.K. (we have heard sound coming from each of them depending upon the hookup). It tells us that the power amplifier is O.K. because each "half" of the power amplifier is driving its loudspeaker just fine when the input signal to the power amp is good. Thus the problem must be the line section of the preamp (or the connection cable between the preamp and power amp) because they are the only links left that can cause this problem in this manner. Obviously you are going to check the connection cables by substituting a replacement set before calling us or before sending the preamp off for repair aren't you?

If the Problem had been Noise?

Then you would have had hum or hiss from the right channel all the time. The level of the noise would not have varied with the volume control setting because the line section of the preamplifier is after the volume (and balance) controls and thus is not affected by their settings. The noise would have been at a constant level through the right channel only, no matter what source you selected and no matter where the volume control was set. When you swapped speaker wires, the noise would have switched to the other speaker, eliminated the speakers as a suspect - the only kind of noise that can originate from the speakers is a mechanical buzz or rasp made by a rubbing (defective) voice coil - the speakers cannot make a hum or hiss all by themselves - except for AC powered electrostatic speakers under very unusual conditions.

When you swapped the input from the preamp to the power amp (after putting the speaker wires back to normal, of course) then the noise would have changed to the left side - following the output from the preamp. This would have eliminated the power amplifier from consideration as each channel played quietly when connected to the left output of the preamp. Again, the only thing left is the right line section of the preamplifier that can cause the problem. Note: A loose interconnect cable ground connection can cause such a horrible loud hum that it swamps out both channels even though only one cable is loose. Turn the system off immediately and check all connections!

One More Example

Now let's see what happens if we have an open signal conductor in the interconnect cable between our cassette deck left output and our preamp left tape input. Note that in the following sketch the tape monitor switch has been set to the "Tape" position because we want to play back a tape recording.

Now any tape recording we try to play back will lose its left channel. Since this will happen when we try to make a recording of any source (CD, Phono, FM, etc.) we know the problem is not with those sources. Since the system works just fine when any other source is directly selected we know the problem can't be with the speakers, power amp, or preamp. Thus it is a tape recorder problem (or the connection cables thereto).

If we swap the connection cables at the tape recorder, left channel to right and right to left, then we will find we now have no playback from the right speaker, confirming a tape recorder or connections problem. If we swap only the cables connected to the tape inputs at the tape recorder, the problem will not change channels. This tells us that the connection cable normally between the left input of the tape recorder and the left tape output on the preamp is good because signal gets through it when it is hooked to the right channel.

If we swap only the cables connected to the tape outputs at the tape recorder (left to right and right to left) then the problem will change channels. This tells us that the cable is open because the left tape output section is working now - driving the right side of the system. Replace the cable and you won't have to call a serviceman at all.

Another approach when you are having trouble with a tape recorder is to first try and play back a tape you previously made that you know is O.K. If it plays back fine, then the problem cannot be with the playback section of the tape deck or its output cables. Try making a recording and playing it back on a friend's system. If

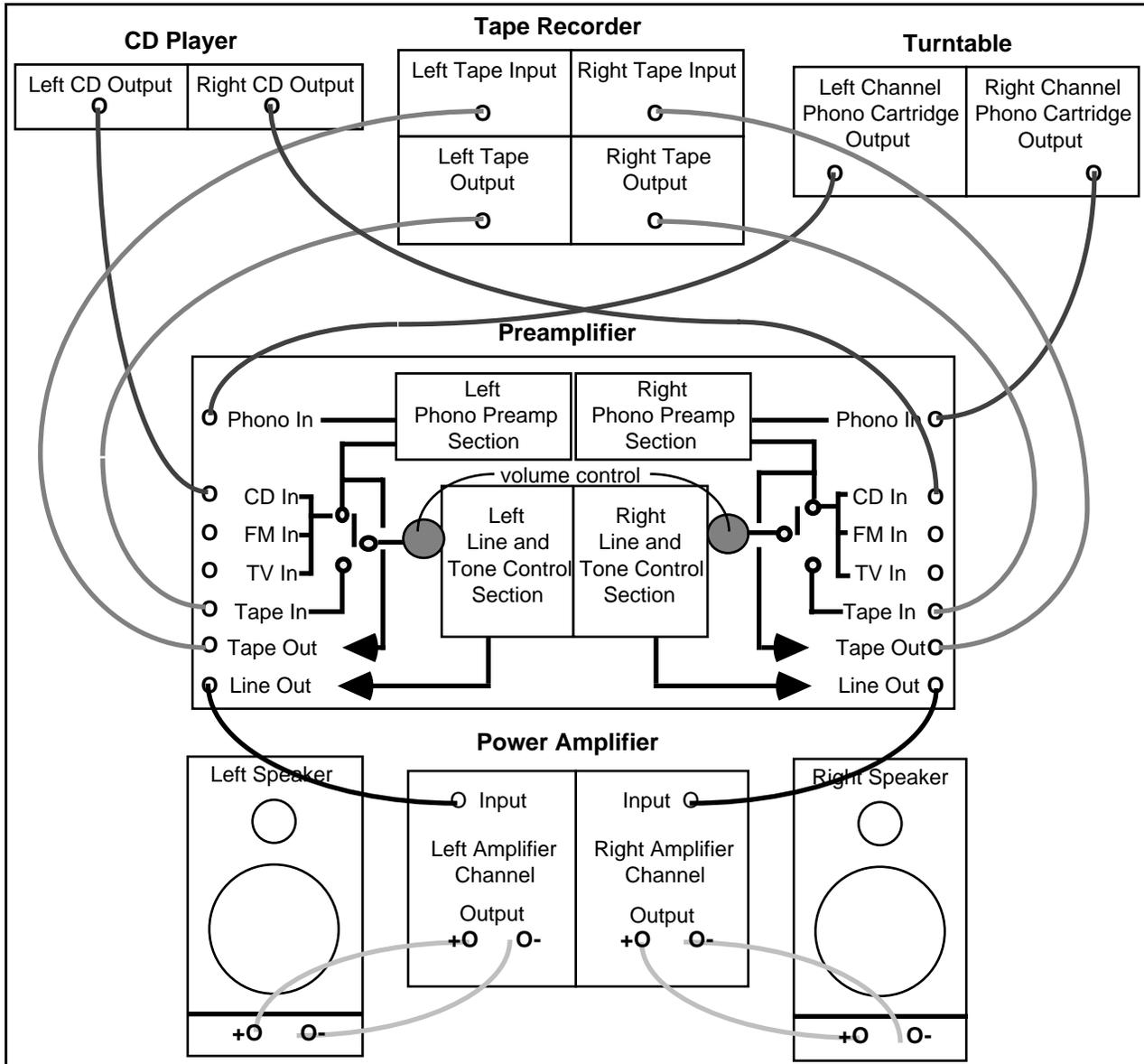
it plays back fine on another tape deck then your problem cannot be in the recording section of your deck or its input cables. A little careful logic can solve many problems easily and inexpensively.

Let's Trace the Recording Path

While the sketch is handy, let's trace out the signal path of a recording for the Right Phono Channel so you can more easily see where the signal is going. Start at the Right Channel Phono Cartridge Output of the Turntable. The signal goes from there to the right Phono In jack on the Preamplifier, through the Right Phono Preamp Section (where it is amplified about 20 dB overall and equalized - the bass boosted about 40 dB in relation to the highs). The signal then goes to the preamp's selector switch (not shown) where the Phono position is selected. This signal then is fed to the Tape Output of the right channel. Since the Tape Monitor switch is now set in the Tape Position, the Phono signal is not sent directly into the volume control and line section. From the Tape Out of the preamp, the signal travels to the Right Tape Input of your Tape Recorder where it is recorded and sent on to the Right Tape Output of the recorder (technically, with single head cassette decks, the input signal is connected to the output during recording because you cannot record and playback at the same time with a single head). The signal then goes from the Right Tape Output of the Recorder to the Tape In of the Preamplifier, on through the Tape Monitor Switch into the volume control, Right Line and Tone Control section, and finally on to your amp and speakers. The system is complex and that means we have not yet run out of things to say and we hope what we have said has been worth the money for you!

Frank Van Alstine

A Troubleshooting Diagram and Flow Chart to help you track down Hi-Fi System Problems the Inexpensive Way!



Here is a diagram of a typical audio system. Use this diagram, and the flow chart on the next page to easily isolate and identify a defective component or cable without the need for any test instruments, tools or special engineering training — just a little bit of common sense and logic.

Note that the selector switch on the preamplifier has been eliminated for the sake of making the drawings reasonably easy to follow. Obviously, it would allow selecting of only one source (Phono, Tuner, CD, etc.) at a time instead of blending all of them together as this drawing shows. The tape monitor switch and the volume control have been shown in their proper relationship to the circuits. Note also that your stereo system is really two mono systems packaged together! You have separate left and right halves of nearly everything. These “halves” can be re-connected to find “weak links” in the audio chain.

**Audio by Van Alstine
Troubleshooting Flow
Chart 12/18/87 FVA**

